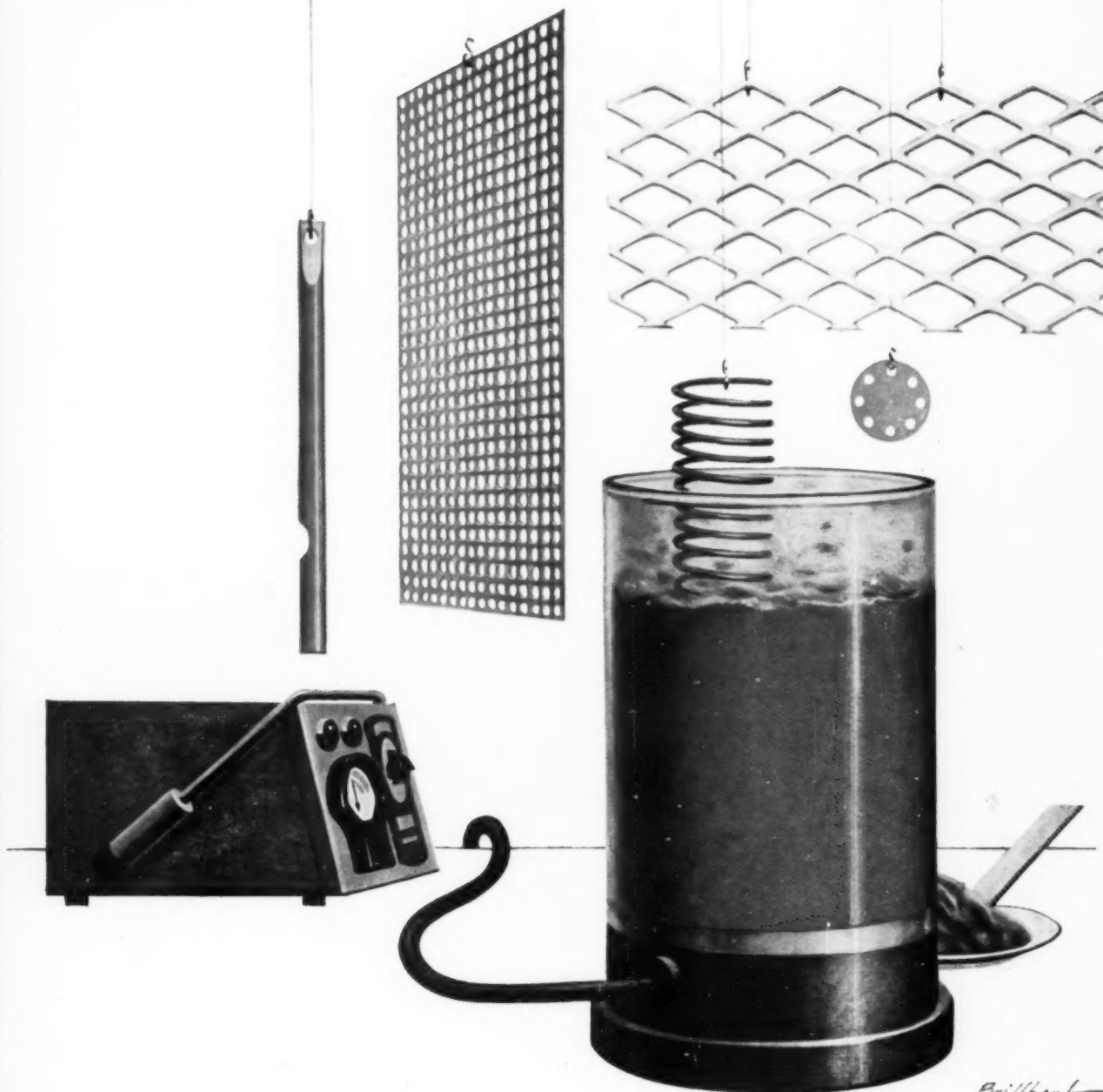


MODERN PLASTICS

JULY 1959



How epoxies can serve you p. 79

Where does Blow Molding go from here? p. 88 | **Electrical treatment of PE film for printing** p. 101

DEPARTMENTS NOW UP FRONT | *Plastiscope* p. 39

Letters to Modern Plastics p. 46 | *New Machinery—Equipment* p. 48 | *U. S. Plastics Patents* p. 54 | *World-wide Plastics Digest* p. 56

Which phenolic
would you pick
for sparks?
shock?
steam?



Good Plenty of distributor caps are molded of Durez general-purpose phenolic. When cost is a prime factor, general-purpose does the job and does it well.

BEST If you're shooting for a little something extra in a distributor cap (or in almost any electrical part), take a look at *Durez 2271*. This is an electrical-grade phenolic. It has high arc resistance and dielectric strength. A $\frac{1}{8}$ " test disk withstands 12 kv at 180°F in air for an hour or more without puncturing. Cost? A lot less than you might suppose. Reason: 2271 weighs less than comparable electrical-grade materials, so gives you more pieces per pound.



Good You'd be right in choosing *Durez 791 Black* for a piece like this telephone handset. You'd be able to count on low molding cost because of 791's fast cure. You'd get the required physicals in good balance. And the price of this wood-flour-filled material is low.

BEST Then why do telephone men favor a different material, *Durez 12995*, for handsets? Because this premium compound supplies *extra* measure of the properties a good handset needs. Wood-flour-and-flock filler provides higher resistance to impact fractures. The rich black finish presents an unyielding front to moisture and body acids. Bonus: a part that *more* than meets the specs—for fractions of a penny per piece.



Good For bottle caps, there's a bevy of budget-right Durez phenolics. They cure fast to take advantage of the built-in speed of automatic presses. They don't bleed even in contact with alcohol.

BEST However, for bottle caps that may sometimes have to take a steam-bath sterilization, molders and designers choose *Durez 17507*. Why? Because it's better. The mineral-and-flock filler gives it a stubborn resistance to autoclaving at 275°F. Result: a more durable product. Cost: pennies per pound.

Widest choice in phenolics

You'll find more ways than ever to meet your design requirements in today's big family of Durez phenolic molding compounds. Have you looked at them lately? To get an idea of what Durez materials can do for you, send for illustrated 8-page Bulletin D400. It lists properties, uses, advantages of typical compounds.

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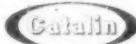
sistance and resiliency eliminate on-the-job breakage and leakage problems caused by rugged handling and carelessness.

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*The Plastex Company, 3232 Cleveland Ave., Columbus 24, O.

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• THE PLASTISCOPE

Section 1 39

Section 2 174

Questions for plastics processors who desire FDA approval (p. 39); Penton to compete with metal (p. 174); boom in vinyl floor covering (p. 43); pipe and fitting news (p. 176); Grace Co. buys Hatco (p. 180); "breathing" film by Plax (p. 43); light-stable polystyrene (p. 178).

• EDITORIAL

A lesson in public relations 218

The industry's crash program on educating consumers in the use of PE film is fine, but what is really needed is a continuing and vigorous program of public relations.

• GENERAL

Everybody needs epoxies 79

Where are epoxies used, what can they do, how are they processed? These are the questions that this series of articles will answer. There is hardly an industrial area today where epoxies cannot be used. These range in application from patching compounds to missile components. This month's articles deal with the important subject of coatings. Four types are covered:

Solvent solution coatings—versatile workhorse 80

Ester coatings—variations unlimited .. 82

Emulsions—why and how they are used 83

Solventless coating—dream come true 85

"Trunk space" for small cars 86

Owners of sports cars or small foreign vehicles now have a solution to the persistent problem of where to put the luggage—a reinforced polyester trailer. Weighing 275 lb., the unit carries loads up to 1000 pounds. By going to reinforced plastics, the manufacturer saved 50 percent. Step by step production details are given.

Blow molding—economics and markets 88

The mushrooming field of blow molding has given rise to six distinct processing methods, all competing for dominance in the market. This article spells out the advantages and disadvantages of each system, analyzes their respective economic positions, and defines the overall market potential. Included are two detailed case studies covering bottles and dolls, as well as diagrams outlining the six methods.

How to perforate thin PE film 93

The plastics film industry, buffeted by severe criticism on the matter of children's deaths attributed to suffocation caused by PE film, has taken several steps to safeguard the youngsters of this country and at the same time protect the consumer from losing the benefits of the material. Perforating the film is one of the solutions. Several systems have been developed; two, available to the industry without charge, are described.

It adds up to savings 94

When Remington Rand decided to redesign some of its adding machines, it switched to thermoplastics at significant savings. The custom molder who did the job made important contributions in the development of the new design. They point up an important area in which the custom manufacturer can serve the end user in finding the most economical production method.

Unbreakable spouts—for less 96

Manufacturers of coffee makers have long faced a twofold problem: how to replace breakable glass spouts without going to the expense of stainless steel. One major producer has found the answer in injection molded polypropylene. Reasons behind the choice are given in detail and cost factors analyzed for different models.

Dual-purpose thermoform 98

After years of packaging his product in paperboard, a manufacturer of artists' supplies now turns to formed impact styrene for a double strike: not only are packaging costs reduced but the package itself now also serves as a working tool for the artist. In one instance the cost reduction was 30 percent.

Modern Plastics Executive and Editorial Offices: 575 Madison Avenue, New York 22, N.Y. Please mail all correspondence, change of address notices, subscription orders, etc., to above address. Quotations on bulk reprints of articles appearing in this issue are available on request.

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• ENGINEERING

Surface treatment of PE film by electrical discharge 101

Two methods of treating polyethylene film for printing have achieved commercial acceptance: flame treatment and electrical discharge. Only meager information has so far been available on the latter. This article represents the first study of the main variables (applied voltage, gap distance, rate of web travel) relating to the electrical discharge method, with particular attention to slip additives. *By H. E. Wechsberg and J. B. Webber.*

Problems with premix molding—Part 3 110

How to cope with sticking in the mold, warping, delicate inserts, very large inserts, and thin-wall problems. A number of actual cases are cited and illustrated, showing how the problems arose and how they were overcome, with special emphasis on mold design considerations. *By R. B. White and R. S. Jackson.*

• TECHNICAL

Polyvinyl fluoride film 121

A recent Du Pont development, PVF film, is the first flexible plastic film available in the lower price range to offer inherent weatherability coupled with outstanding chemical resistance and toughness. This article presents the range of properties and lists potential fields of application where this material may find use. Results of long-term Florida tests are reported. *By Verne L. Simril and Barbara A. Curry.*

Organosol formulations for stir-in dispersion-type PVC resins 126

The field of dispersion resins has grown to sizable proportions; about 70 to 80 million lb. were sold in 1958. This increased usage has resulted in considerable research on the proper compounding of PVC organosols, especially in developing formulating principles using stir-in type dispersing resins. Results of one such investigation are reported in this article. Several recipes are included to illustrate the versatility of the material. *By Arnold C. Werner.*

• DEPARTMENTS

Letters to Modern Plastics 46

Where our readers sound off

New Machinery—Equipment 48

What it can do, how much it costs

U. S. Plastics Patents 54

Issues on new materials, processes

World-wide Plastics Digest 56

Condensations of significant articles published in other magazines

New Developments 136

New ways to use plastics, new design, and new product concepts offer ideas you can use for increased profits

Literature 146

Brochures and books that can help you

Manufacturers' Data 165

Check-off postcard brings booklets gratis

Companies . . . People 200

Promotions, appointments, relocations

Classified Advertisements 208

Index to Advertisers 214

Coming Up

Three new thermoplastics, surrounded by exciting prophecies of economy and utility are causing much end-user and molder speculation. They are Delrin, Lexan, and Penton. Lead article in August issue will present as true a picture as possible of the comparative economics of these three materials versus the materials with which they can be expected to compete. . . . August engineering lead will feature the injection molding of FEP fluorocarbon resin and the production of polyethylene film by extrusion on to chilled roll. . . . September lead may be one article or one of a series dealing with the increasingly important subject of the achievement of flame resistance in plastics. Major material makers are being invited to preview progress they have made to date and technical trends in polymer and copolymer structure to achieve flame resistance. . . . Engineering Section for September will have the fourth and last installment of the series on problems with premix moldings.



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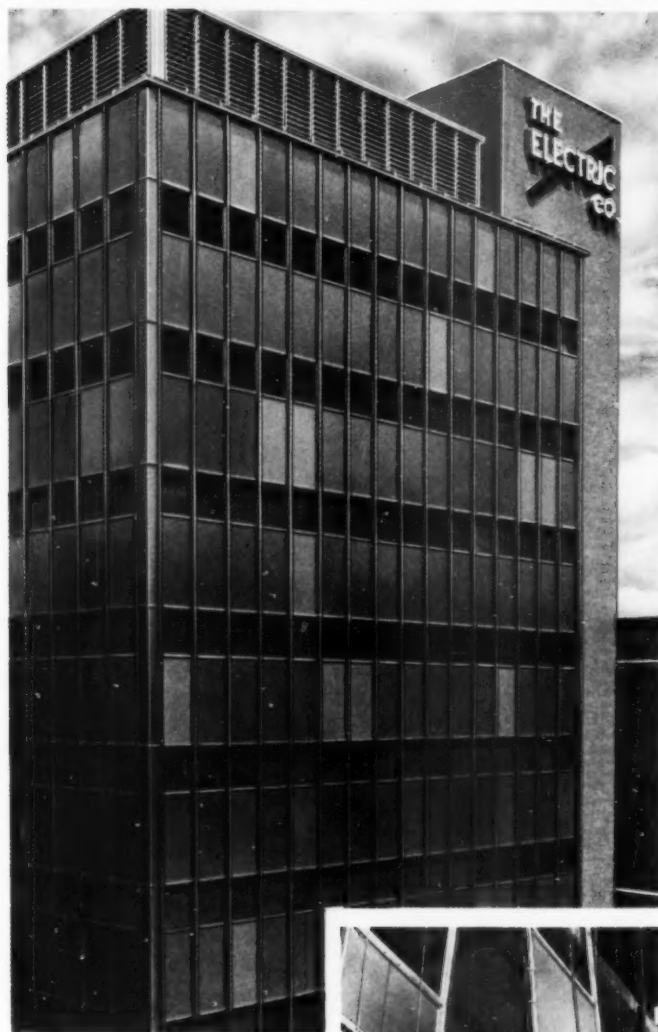
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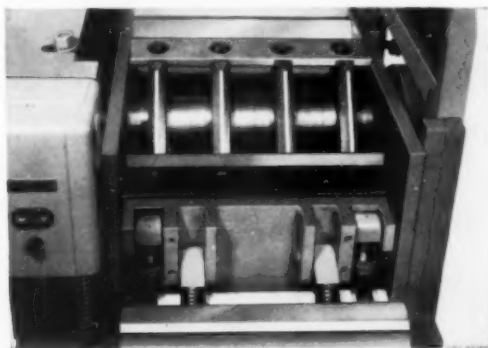
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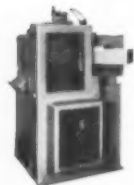
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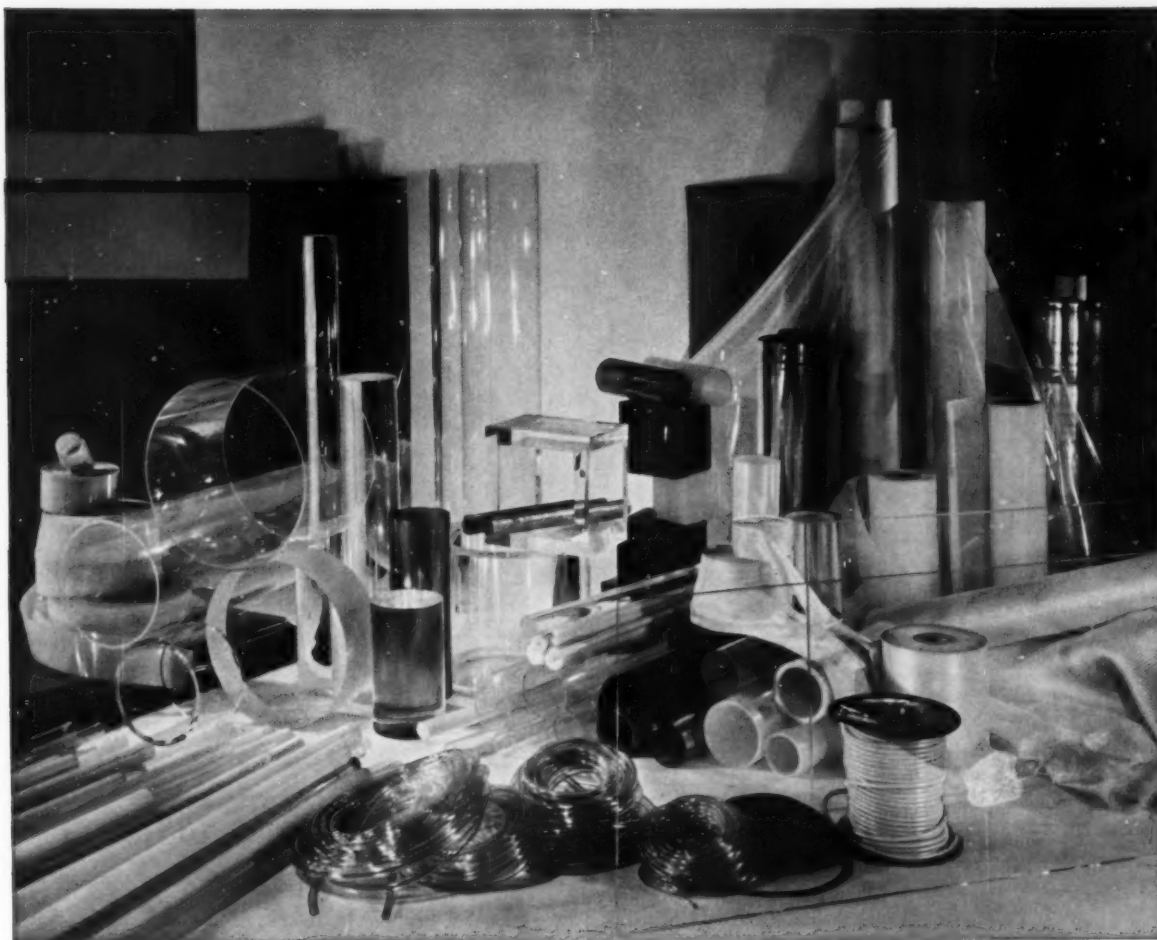


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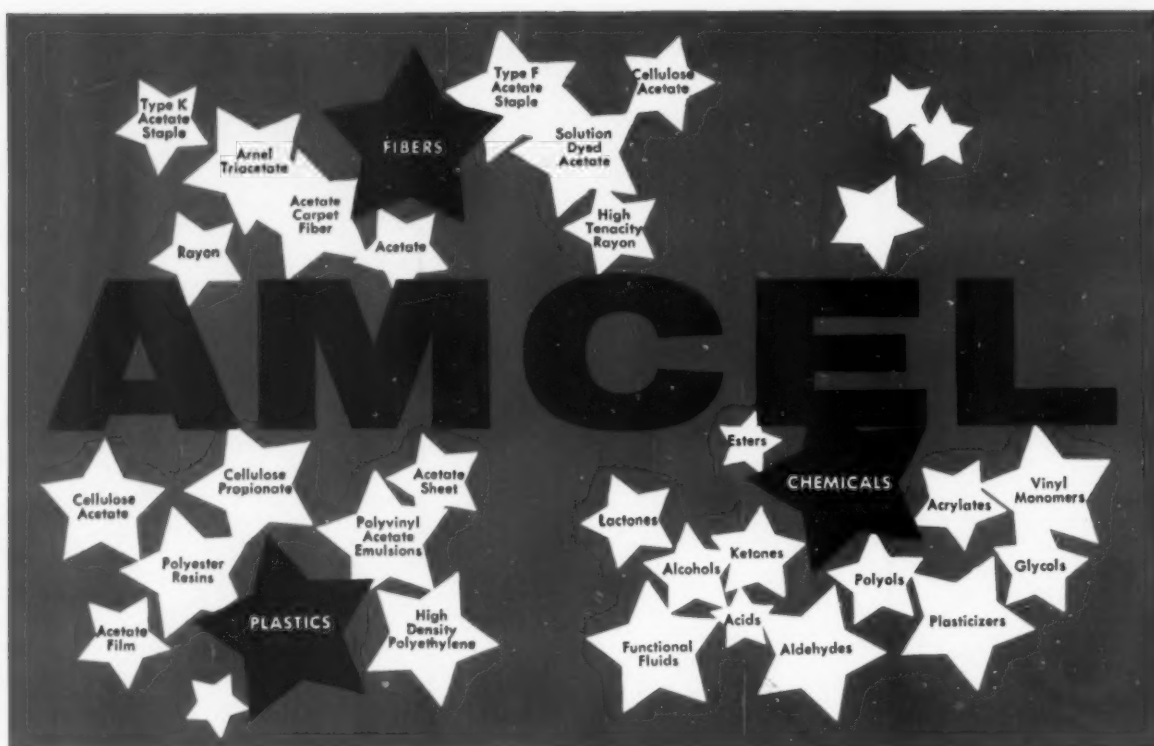
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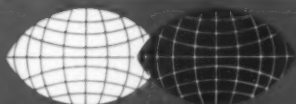
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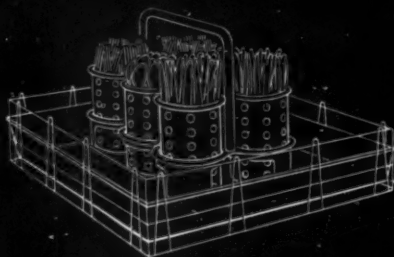
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Melt Index.....	D-1238-52T	—	0.2	0.7	2.5	5.0
Heat Distortion Temp. (66 psi).....	D-648-43T	°F.	185	185	180	180
Brittleness Temp.....	D-764-52T	°F.	—200	—180	—160	—100
Impact Strength, Izod.....	D-256-54T	ft. lb./in.	23	18	13	3
(1/4" x 1/2" injection-molded bars)						
Tensile Strength, Max., 0.2 in./min.....	D-638-52T	psi.	3700	3600	3500	3300
Elongation, First Tensile						
Yield Point.....	D-638-52T	%	25	25	25	25

Properties of Fortiflex "A" Not Affected by Melt Index

PHYSICAL PROPERTIES	ASTM METHOD	UNITS	VALUE
Density.....		g/cc.	0.96
Refractive Index.....	D-542-50	n _D ²⁵	1.54
Hardness, Shore D.....	D-676-49T		85
Stiffness.....	D-747-50	psi.	150,000
Water Absorption.....	D-570-54T	% wt. gain	<0.01
[1/4" specimen, 24 hr. immersion @ room temp.]			
Flammability.....	D-635-44	in./min.	1.0
Mold Shrinkage, length.....		in./in.	0.03 to 0.05
width.....		in./in.	0.02 to 0.04

*Measured on injection molded tensile bar. Mold shrinkage depends on part design and molding conditions.

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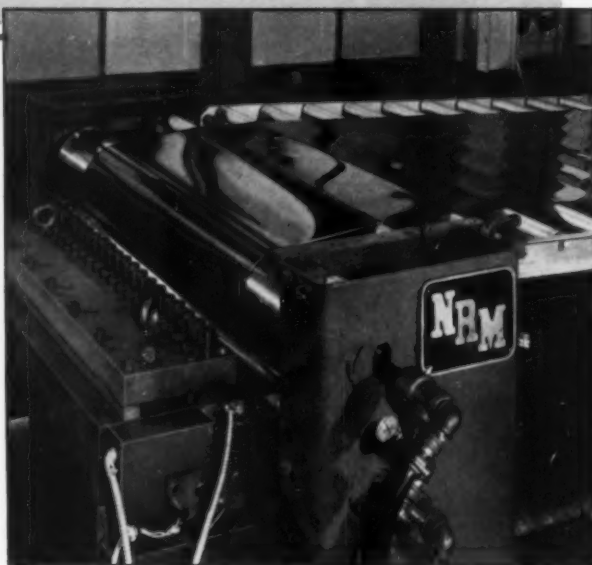
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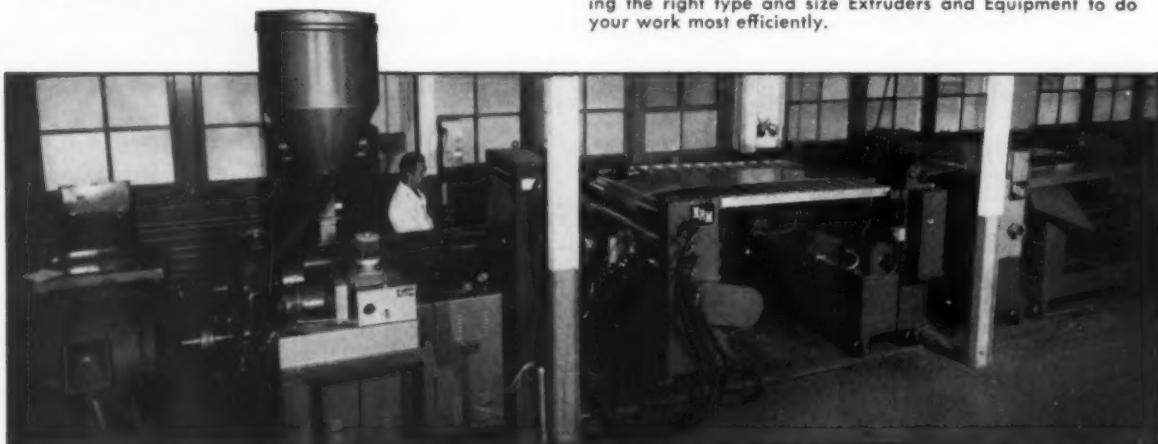
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Photo courtesy United Plastics & Development Co., Kent, Ohio

New—and worthy of note!

What makes the cone-shaped markers pictured above worthy of note is that they're made of a vinyl plastisol.

The advantages are obvious: Higher strength and lighter weight; greater resistance to water, oils, greases and tars; easier cleaning; translucency for internal lighting; and brighter colors that won't fade, chip, scuff or rub off.

The plastisol used in making these cones is based on a blend of PLIOVIC resins—consisting primarily of the low temperature fusing PLIOVIC AO and viscosity stabilizing PLIOVIC S50.

The major advantages in using this balanced PLIOVIC blend lie in fast and complete fusion of thick sections at moderate temperature, and balanced flow with a minimum of plasticizer. This eliminates exudation and greatly reduces pigment discoloration. Other advantages include: Ease of mixing. Faithful mold reproduction. Good hot-tear strength. And excellent physical properties. For full details, including the latest *Tech Book Bulletins*, just write:

Goodyear, Chemical Division
Dept. G-9422, Akron 16, Ohio.



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Air Pressure Alone Holds Up World's Largest Fabric Dome!

the problem: To provide a large missile shelter of economical construction, easily transported and quickly erected.

the solution: The Pentadome, made of vinyl-coated nylon, easily transported, quickly erected by ten men in one day.

Procured by the U. S. Army Quartermaster R & E Command for use by the Ordnance Corps, the Pentadome provides missiles and their crews with ideal protection from dust, rain and high winds. The main dome, 85 feet high, 150 feet in diameter, and four smaller connected domes 50 feet high, 100 feet in diameter, are wholly supported by internal air pressure supplied by blowers. Domes can withstand a gale of 70 miles an hour or more.

Birdair Structures, Inc. specified that the 18,000 square yards of nylon base fabric for vinyl coating be by Wellington Sears. Designed to retain flexibility at -40° F., it is the heaviest single-ply fabric ever used in an air-supported structure.

Wellington Sears, with over a century of experience, would welcome the opportunity to help you solve problems related to fabrics, in rubberizing, coating, laminating, or any combination of textiles with other materials. For a useful booklet, "Fabrics Plus," write Dept. K-7.



Preparing to put up Pentadome, made by Birdair Structures, Inc., Buffalo, New York. Wellington Sears nylon base fabric was vinyl-coated by Sawyer-Tower, Incorporated, Watertown, Mass.

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U.S.I. POLYETHYLENE NEWS

A series for plastics and packaging executives by the makers of PETROTHENE® polyethylene resins

NOV. 1966

U.S. Industrial Chemicals Co., Division of National Fertilizer and Chemical Corporation

89 Park Ave., N. Y. 16, N. Y.

Packaging Notes

New research study on packaging has been issued by the American Management Association in book form. The book offers a comprehensive inventory of literature on packaging research. Current trends in packaging research, materials and methods are described. The book also lists principal sources of packaging information, such as periodicals, directories and manuals. The study includes a survey of packaging research needs and the special requirements of particular industry groups. The book is available for \$6.00 from the AMA, 1515 Broadway, New York 36, N. Y.

Polyethylene bags for heavy transformers are saving an electrical equipment manufacturer \$33,000 annually in packaging material costs. The company is shipping transformers ranging in weight from 300 to 1800 pounds in gusseted, 4-mil polyethylene tubing bags.

The transformers are readied for shipment by mounting them on prefabricated wooden skids, placing pieces of single-wall corrugated over the tops to protect the finish. The polyethylene bags are then placed over the transformers.

Previously, the company shipped its transformers in heavy paper covers and wooden crates. The new bags have resulted in substantial savings in labor costs and shipping weight. Hidden damage during shipment has also been reduced.

New machine does four color printing on plastic bottles. The machine accommodates one to four colors, does its printing by offset. The machine operates without mandrels, uses compressed air to print the plastic bottles. The unit employs two large conveyors and twin chains holding 14 bottles on slides.

Expanding carton with polyethylene liner is being tested by the Army as a means of serving hot rations to troops in the field. The carton, which holds dehydrated rations, has uncut, pleated top flaps which increase the carton's volume by a third when open. A polyethylene liner is unfolded and placed in the carton, hot water is poured into the liner and the dehydrated rations are placed in the liner and reconstituted. The increased size of the opened carton easily holds the extra volume of the reconstituted rations. The liner and carton form a leakproof mixing and serving container.

The new carton is expected to have civilian retail applications for powdered food products requiring the addition of liquid. These might include such mix-and-serve products as fruit drinks, milk, cocoa, gelatin desserts, pudding, hot cereals and instant coffee.

U.S.I. Offers New Literature For Polyethylene Processors, Packagers

Data on Film, Pipe, Molded Housewares, New Commercial Standards

Valuable information on polyethylene processing and packaging is now available from U.S.I. in the form of free booklets, processing tips and reference data. The information is based upon U.S.I.'s extensive polyethylene research conducted at the company's Polymer Research Laboratory in Tuscola, Ill. and from industry-wide marketing and packaging studies.

Among the literature offered is:

Poly-Coated Pipe Resists Underground Corrosion

The first steel pipe in the industry to be coated with an extruded plastic is finding widespread use by gas, oil and chemical companies with underground pipeline installations.

The pipe is factory coated with extruded polyethylene applied over an elastic adhesive undercoating. The coating has high insulation resistance and dielectric strength. This is especially important in underground pipelines where stray ground currents are a troublesome cause of pipe corrosion. The plastic coating is so tough and resilient that rocks can be bounced off the pipe without piercing the coating. The pipe can be bent in the field without damage to the coating.

Polyethylene Film "Bubble" Speeds Construction Work

A "warm air bubble" of polyethylene film inflated over excavation site thaws the area sufficiently for concrete to be poured even in subfreezing winter weather.

This novel application of polyethylene film has been used successfully by several construction companies. In one operation a 50 x 64 foot sheet of film was anchored to the ground with cement building blocks and inflated with warm air from the blower of a temporary furnace. About two pounds per square inch pressure was used. Concrete was then poured in temperatures that ranged down to zero. The bubble was left up for three days to give the concrete time to cure without freezing.

New U.S.I. Plant Reaches Full Output In 6 Weeks

U.S.I.'s new 75 million pound polyethylene plant at Houston, Texas, reached capacity production just six weeks after going on stream.

Production reports show that quality of the material produced is high. A sizeable proportion of the output to date has been film grade and coating resins. Plans are already underway to double the capacity of the Houston plant by the third quarter of 1966.

PETROTHENE Polyethylene — A Processing Guide — A 96-page booklet discussing



technique for processing polyethylene, processing problems, and polyethylene properties.

Formulas and Tables for Polyethylene Film and Bags for determining such factors as feet of film of various gauges from a given quantity of resin; weight per 1,000 feet of film, or number of bags of a given size that can be made from a quantity of polyethylene film. The tables are particularly useful to film extruders and those who make or use polyethylene film bags.

Slide rules with the same type information are also available.

Which Polyethylene Film Should I Use, which relates to the new Recommended Commercial Standard for Polyethylene Film (TS-5438) and indexes the various types and gauges of polyethylene film recommended for different packaging jobs. The corresponding PETROTHENE resins for each type film are also listed for easy reference by extruders.

Other literature offered includes a booklet on polyethylene pipe standards, "How to Choose and Use Polyethylene Plastic Pipe," "The Goose That Laid The Golden Egg," U.S.I.'s famous guide for buying polyethylene housewares; a complete collection of the well-known "Processing Tips" which U.S.I. has published regularly in leading plastics publications; and the booklet "Polyethylene Creates New Opportunities in Packaging."

To order any of this material, write to Editor, U.S.I. Polyethylene News, U. S. Industrial Chemicals Co., 99 Park Avenue, New York 16, N. Y.



Vol. IV, No. 4

POLYETHYLENE PROCESSING TIPS

HOW TO ACHIEVE SATISFACTORY PIGMENT DISPERSION IN DRY COLORING

Dry coloring thermoplastic resins with pigments is a firmly established method for producing colored plastic articles. It has the inherent advantages of low cost, minimum quantity of uncommitted resin inventory, minimum losses due to obsolete colored polyethylene, and faster customer service on special orders.

For these reasons, polyethylene molders and extruders have made dry coloring the choice for all but the most exacting color applications.

Satisfactory pigment dispersion is the key to turning out a quality product by dry coloring. Factors affecting how well the pigment is dispersed in the resin include processing conditions, pigment characteristics, and resin properties.

Processing Conditions

Adequate tumbling is necessary for intimate mixing and uniform distribution of pigments all around the polyethylene pellets. For conventional drum tumblers, operating rates of 30-40 rpm and tumbling times of 15-30 minutes are recommended. If wetting agents are used, clear polyethylene should first be tumbled with them alone. Then the pigment should be sifted onto the pellets and the tumbling repeated.

Additives should be used with caution lest they adversely affect dispersion or resin properties. Wetting agents or lubricants, if used, must be compatible with polyethylene. The quantity added should be held to a minimum (about 0.2 lb per 100 lb of resin) to reduce the possibility of pigment agglomeration, additive exudation, or both. Too much low-molecular-weight polyethylene, which improves dispersion, must be avoided or physical properties of the resin, such as stress crack resistance, may be impaired.

Pinpoint gating and small-diameter nozzles improve dispersion and, wherever possible, should be incorporated in the mold design. Such mechanical aids as dispersion plugs or breaker plates will improve dispersion. Often, however, these mean a sacrifice in production rates.

Absolute cleanliness of hopper, tumblers, and other equipment is a must. This is particularly important where several colors are to be processed.

Pigment Characteristics

To be sure of results, stringent quality specifications for pigments are a necessity. Pigments must be of high quality, finely ground, and readily dispersible. They must also be stable to heat and light, not change color in the molding process, and not migrate or bleed in the molded piece. The amount of color added is dependent upon the type of pigment but normally will be in the range of 0.1 to 1.0 lb per 100 lb of clear polyethylene.

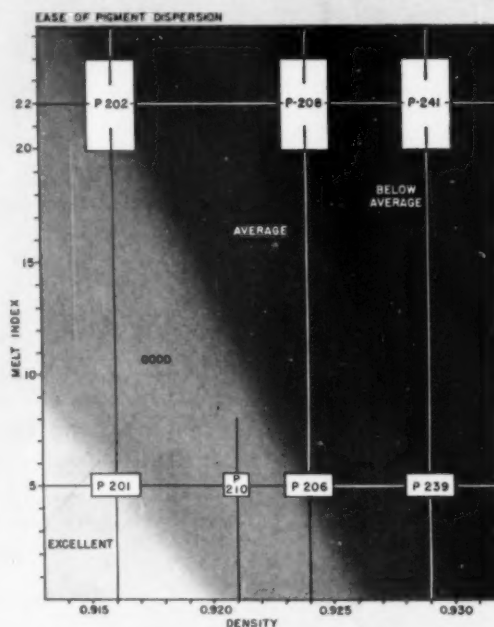
Resin Particle Size and Density

Superior dispersions are obtained with polyethylene of uniform pellet size, without "longs" or excessive fines. Cubes $\frac{1}{8}$ in. in size, or smaller, are recommended for maximum color uniformity, because the smaller

the pellet, the more uniform will be the color.

The density of the resin affects the ease with which pigments can be dispersed. Tests at the U.S.I. Polymer Service Laboratory show that for PETROTHENE® resins in the 0.914-to-0.929-density range, ease of pigment dispersion decreases as the density increases.

Dispersibility ratings for seven PETROTHENE resins within this range, and having melt indexes of 22 and 5, are charted on the accompanying graph. In all cases, an organic pigment difficult to disperse was tumbled with the resin, and the resultant compound molded in a conventional molding press. No mechanical dispersion aids in the nozzle or chemical dispersion aids such as mineral oil were used. Molding



conditions were kept as uniform as possible. Ratings were based on visual examination of the moldings under a strong light. As the graph shows, all other conditions being constant, a lower-density resin makes good color dispersion easier to attain. But it should be remembered that different results may be obtained by using dispersion aids, modifying mold design, or otherwise altering processing conditions.

U.S.I. technical service engineers can recommend the best PETROTHENE resins, coloring formulations, and processing conditions for various applications. They will be glad to work with you on any current production problem or future dry-coloring applications you may have.



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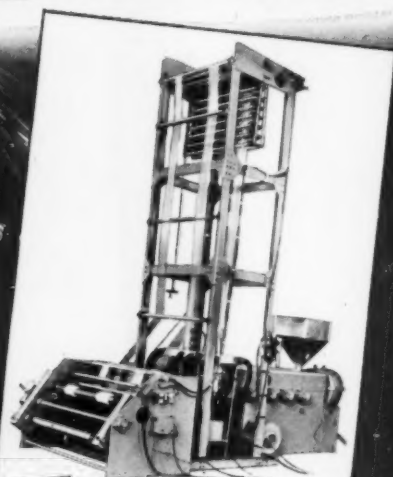


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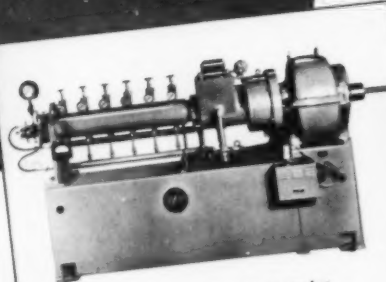


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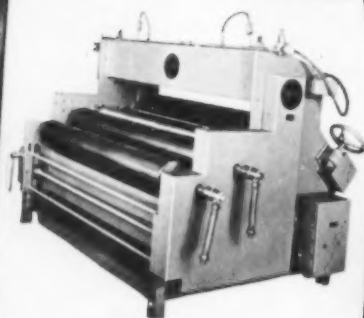
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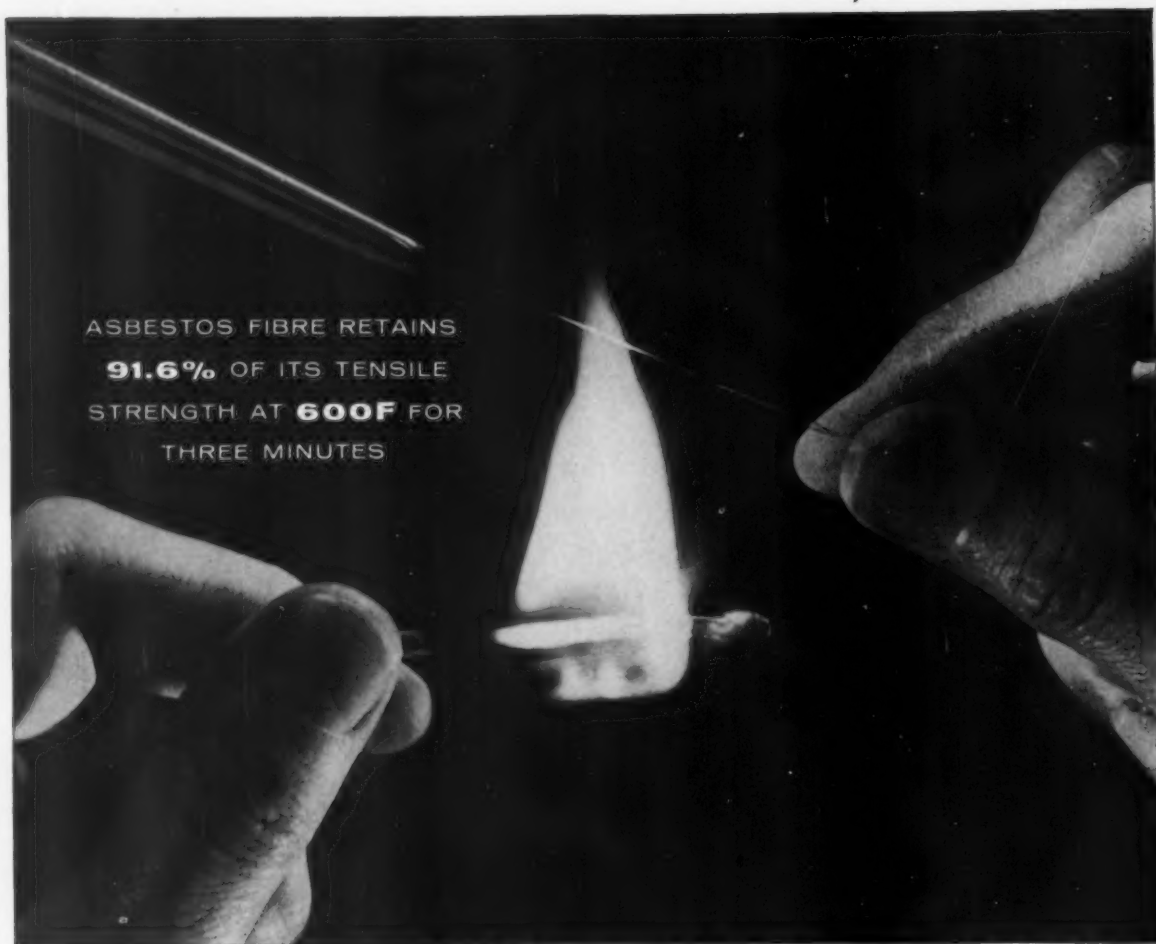
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Now . . . by reinforcing with the "magic mineral" to gain amazing heat-resistance . . . suppliers of plastic components can open up new avenues of profit in a wide variety of industries.

Here are just a few proposed and new product developments utilizing asbestos-reinforced plastics:

- automobile exhaust pipes and distributor heads with exceptional thermal stability
- guiding vanes for rocket motors where temperatures exceed 4500F
- furnace intake baffles that withstand intense heat
- electrical appliance plugs that exceed Underwriter's requirements.

The superiority of asbestos as a rein-

forcer is supported by a study reported recently in MODERN PLASTICS titled "Now —into the space age!" This study disclosed that asbestos fibre reinforced resins seem to hold up best even at temperatures far above normal. For example—even on exposure to hot gases moving at high speed . . . such as in a rocket's blast tube.

In addition to this remarkable property, you will find that Johns-Manville Asbestos Fibre, because it is of the Chrysotile variety, provides the best combination of properties offered by any filler on the market. It bulks, reinforces, controls impact strength, improves dimensional stability. And it even reduces molding costs whether you work with thermo-

plastic, thermosetting, or cold-molded plastics.

If you would like more information on how you can improve plastics with this J-M "magic mineral," write for your free copy of brochure AFD-8A. Address: Johns-Manville, Asbestos Fibre Division, Box 1500, Asbestos, Quebec, Canada.

Characteristics of J-M Chrysotile Asbestos used in the Plastics Industry:

Type of Asbestos: Chrysotile

Specific Gravity: 2.4—2.6

Color: Dry: Light gray—Wet: Dark gray

Approximate Chemical Analysis:

MgO40-42	FeOTr-6
SiO ₂38-42	Fe ₂ O ₃Tr-6
H ₂ O12-15	Al ₂ O ₃Tr-3

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baby seats illustrated. After installing our new H-P-M 450-P-80 (80 oz.) preplasticizing machine we have improved the quality of these parts while at the same time increasing output to 120 cycles per hour."

This report by H. R. Galloway, President of Minnesota Plastics Corp., St. Paul, is typical of those received on the new H-P-M preplasticizing machines. These baby seats are large, thin wall parts. Mold filling is now faster — more accurate. Parts are automatically more uniform in size and weight and quality is improved proportionately.

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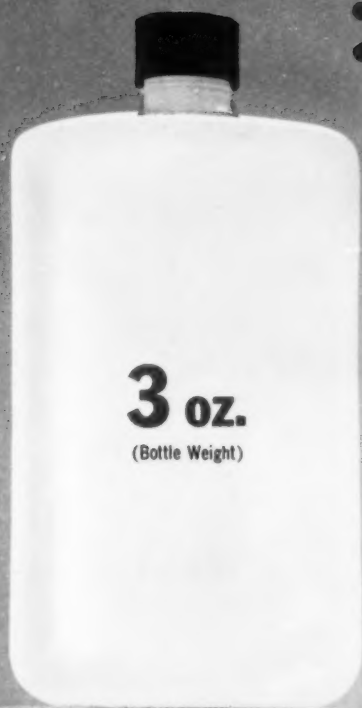
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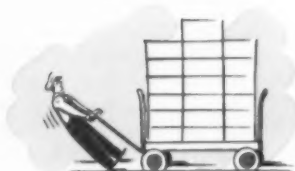
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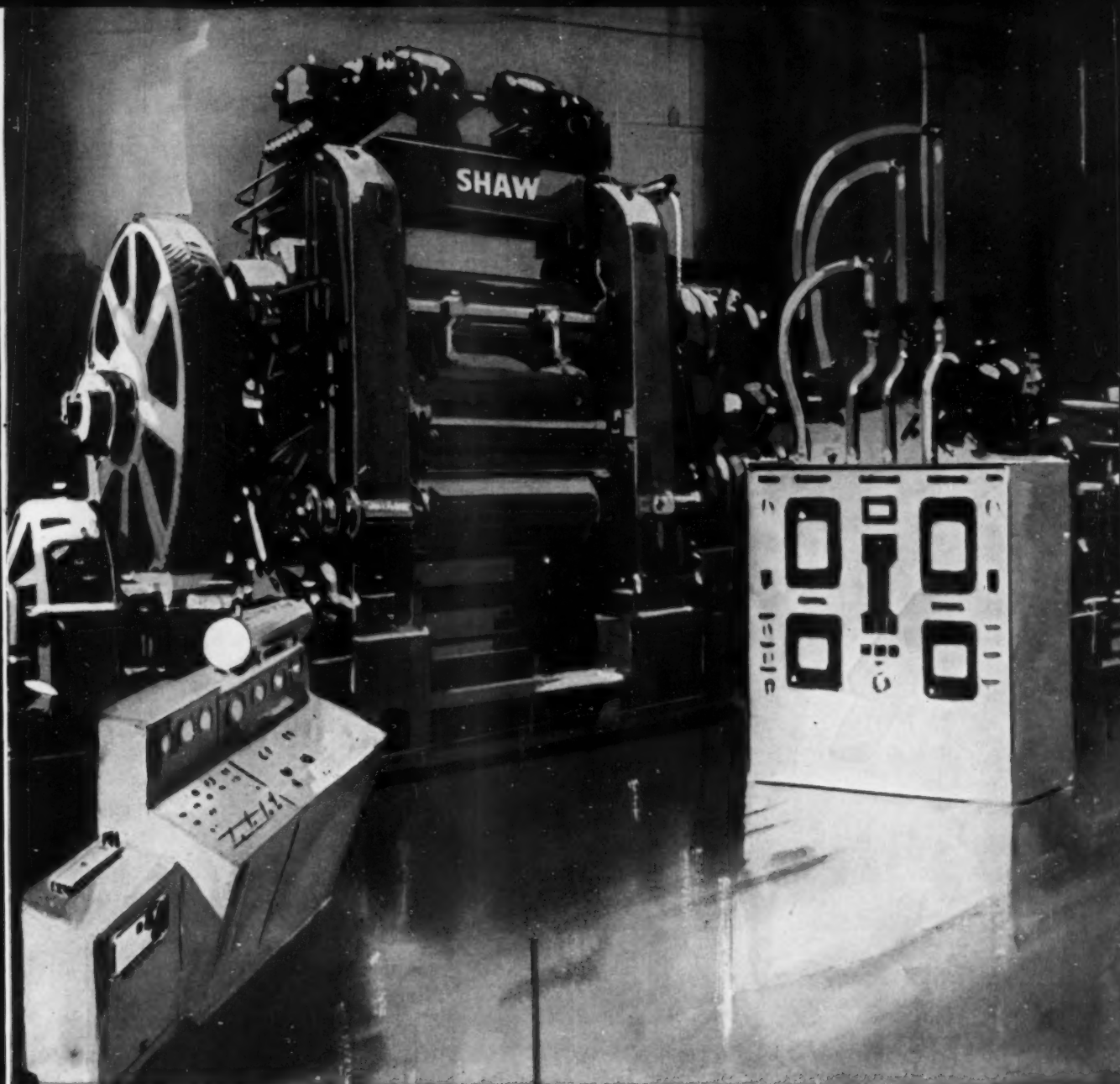
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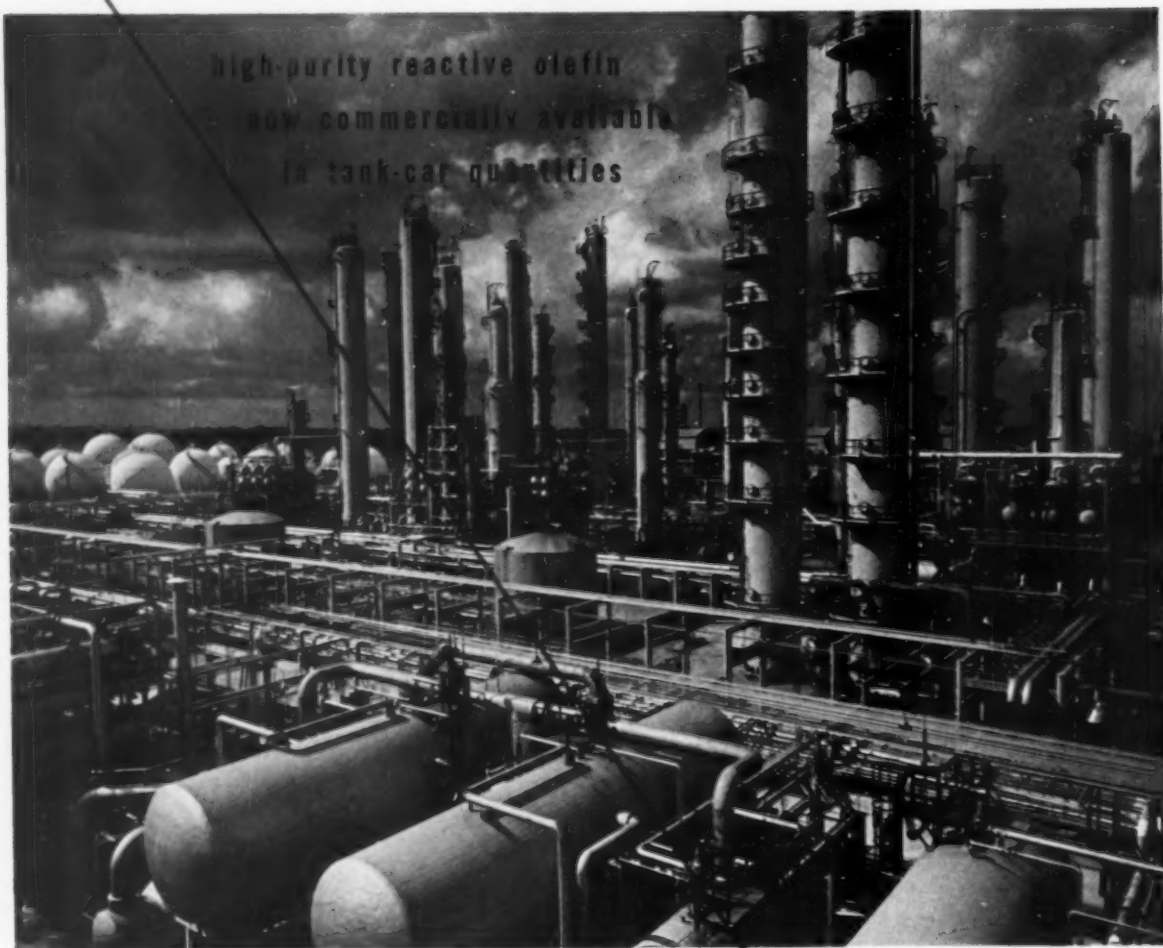
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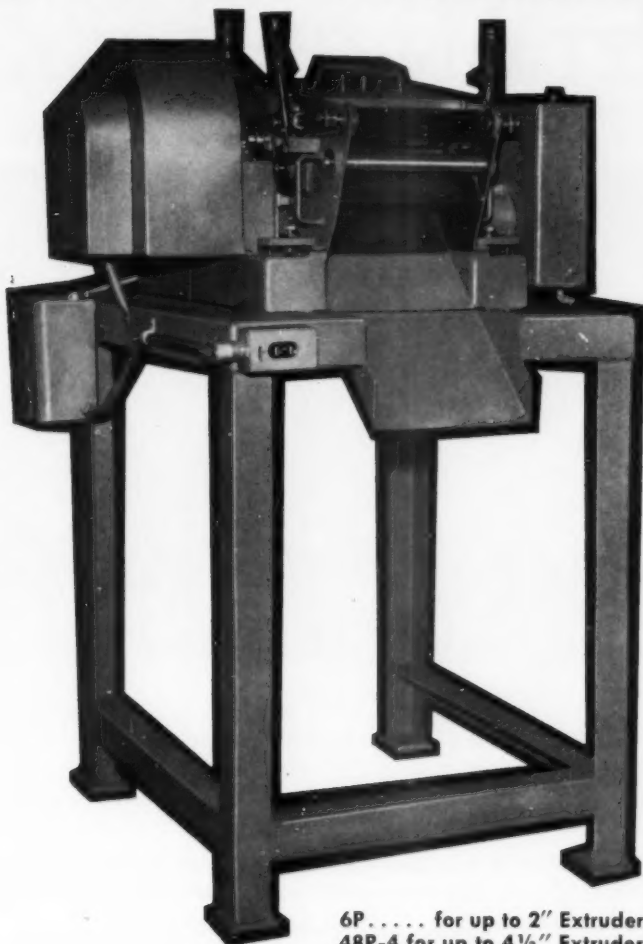
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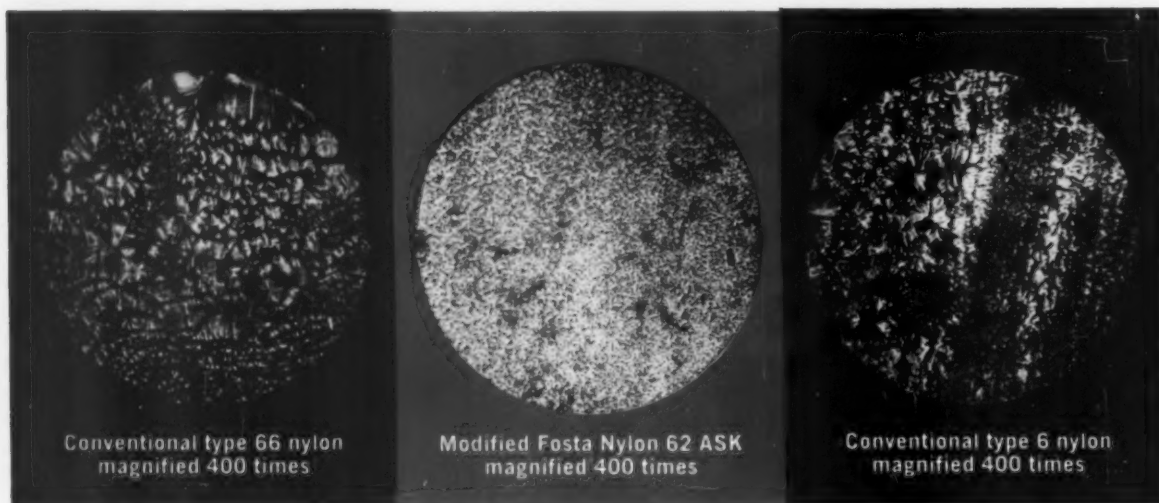
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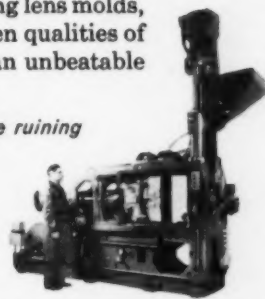
no cloudy streaks...no milky films

Ray Lachapelle, Plant Manager, Plastic Division of American Optical Company in Southbridge, Mass. tells us:

"These viewer lenses are the finest injection molded acrylic lenses of their size produced anywhere in the United States—up to $3\frac{1}{2}$ " x $2\frac{1}{2}$ " and ranging in thickness from .750" to 1". We maintain rigid standards of clarity and quality and the machines on which we run these parts are our new 12-Ounce Lesters. Why? Well, first, we're running a full 4 ounces above the rated capacity of the machine. Second, the effective pressure of the machine produces bubble-free, sink-free parts with unsurpassed regularity. But to us the biggest advantage of the Lester is that internal contamination of the parts—cloudy streaks and milky films—has been practically eliminated.

"We're inclined to think that our technical know-how in building lens molds, combined with the proven qualities of the 12-Ounce Lester, is an unbeatable combination."

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with piston and screw feed
up to 215 pts

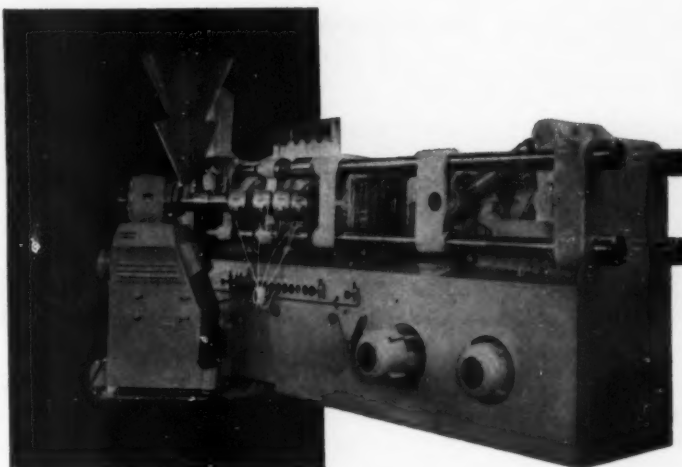
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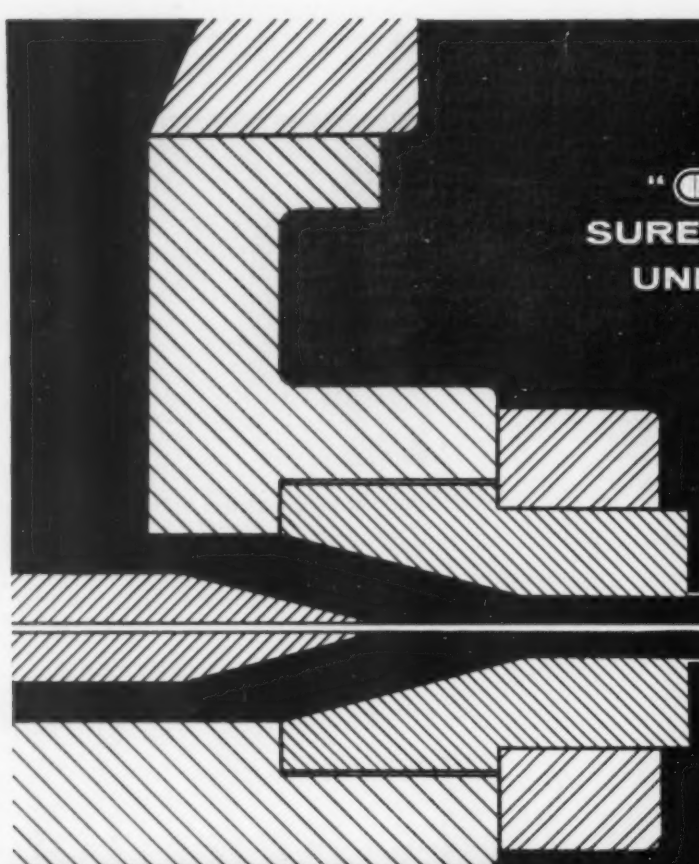
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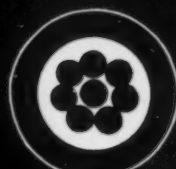
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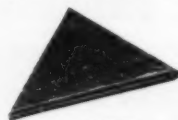
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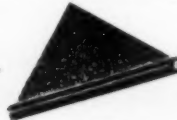
Only a uniformly fine dispersion of carbon black can assure year after year protection to plastic insulated wire and cables that are exposed to sunlight. Maximum resistance to harmful ultraviolet radiation depends upon the concentration of carbon black used, its particle size, and the thoroughness with which it is dispersed. Uniform dispersion of microscopic carbon black particles in "ADP Quality" concentrates will control oxidation and subsequent degradation of plastic wire coating giving you the highest product quality.

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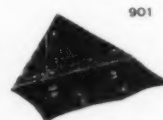
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MINI-JECTOR cuts cost for manufacturers of electrical, electronic, industrial and commercial equipment. Wide variety (above right), all MINI-JECTOR produced, represents important savings over big press tooling where not required. All electrical and electronic parts (above) plugs, cord ends, antennas, miniature brush assemblies, slip rings, etc. (sub-miniature to 1½ oz.) made for less on MINI-JECTOR.

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From 9 stock MINI-JECTOR models and 50 combinations of stock options, you can select the machine to meet your exact requirements. MINI-JECTORS are offered with air or hydraulic power, with self-clamping "V" molds or conventional molds bolted to platens. Clamping may be horizontal or vertical. Operation may be lever controlled, semi-automatic or fully automatic.

Three of the nine popular stock MINI-JECTOR models
Left, Super "Eldorado"; Center, "Wasp" bench model,
Right, "Hornet".



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Quicker — Produce thousands of molded items usually before multiple cavity tooling is off design board.

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Only MINI-JECTOR offers so many exclusive features:

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- . . . for specialty items and molding which involves inserts or loose cores — from intricate electronic parts to novelties, etc. — marketed quicker.
- . . . for quick thousands of perfect parts in a variety of colors. No lost change-over time.
- . . . for even short or moderate runs — too costly on big presses — profitable on MINI-JECTORS.

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New, over 50 pages of detailed, illustrated, complete engineering data and specifications on all MINI-JECTOR models and accessories. Contains complete price list. Many money-saving exclusive features. Shows how MINI-JECTOR helps you develop and produce molded plastic items (sub-miniature to 1½ oz.) more profitably than by other methods. Mail coupon today!

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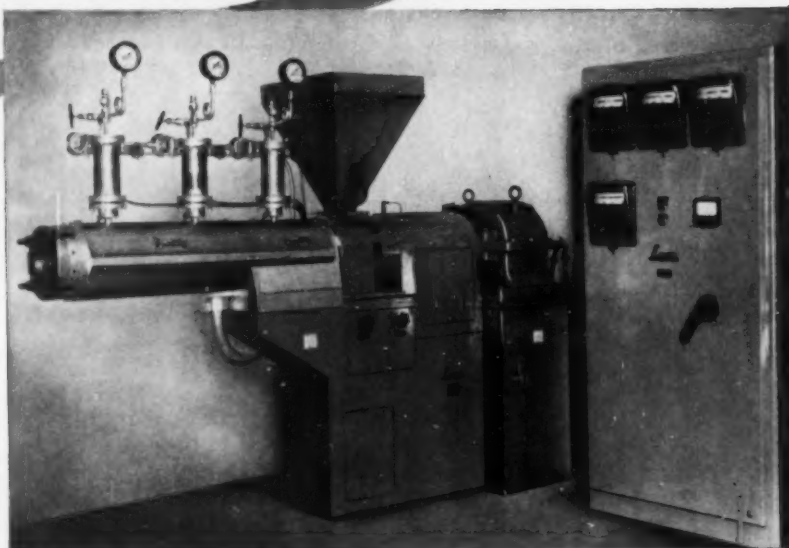
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- ☐ Laminating Dies—up to 120" wide
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Monsanto announces micro- match colors*

a styrene color service that's guaranteed!

The Monsanto micro-match color system feeds spectrophotometric data into a specially developed electronic computer that, in minutes, "measures" colors in precise "dimensions." The result is Lustrex styrene color service faster and better than ever before available to the plastics industry. Variances too minute for the human eye to distinguish can be determined and corrected. So reliable is this system that Monsanto guarantees accuracy within specified production limits even without producing a sample chip! Colors can be produced and reproduced with extreme accuracy and uniformity, from batch to batch, shipment to shipment, year to year—even if the original sample is lost, destroyed or faded!

Micro-colors are available now! Ask your local Lustrex representative how this major achievement in color service can help you. For brochure on Micro-Match Colors, write Monsanto Chemical Co., Plastics Division, Room 960, Springfield 2, Mass.



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New! **EPON® RESIN 1002**

When it's hot it pours!

Now you can say good-bye forever to the hot weather annoyance of having granular resin solidify in the bag. *Shell Chemical's new Epon resin 1002 will not sinter even when your workroom temperature crowds the 100 mark!*

Epon 1002 is a new grade of resin that is hard and free-flowing at elevated temperatures. You will find it more economical to buy and use because it saves labor and handling costs.

It resists sintering during shipping and storage. Epon resin 1002 may be used as a direct replacement for popular Epon 1001 in amine-cured, clear and pigmented surface coating systems, pre-impregnated glass cloth and other applications.

Epon 1002 is similar in performance to Epon 1001. Coating systems based on either resin give superior impact resistance, flexibility, plus excellent

resistance to water, boiling caustic, many acids and most solvents. If force curing is desirable, Epon 1002 coatings are resistant to over-bake.

For greater ease in handling, Epon 1002 is packaged in 50-pound, polyethylene-lined, multiwall paper bags . . . simple to store and use. For complete information, including technical bulletin SC:58-107, write to your nearest Shell Chemical district office.

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IN CANADA: Chemical Division, Shell Oil Company of Canada, Limited, Toronto



THE PLASTISCOPE*

News and interpretations of the news

By R. L. Van Boskirk

Section 1

July 1959

Questions for plastics processors who desire FDA approval. Since enforcement of the new Food Additive Amendment, which requires that a food package must be proved non-toxic before use, questions have been multiplying on procedure. For example, the law exempts from clearance procedure those materials generally recognized safe by qualified experts. But who are qualified experts and how many opinions would be required to set up a disagreement?

Another question is, should the interested party go to the government first for approval or wait for the government to say yes or no after his product is on the market? If he is sure that no toxic element migrates from his plastic he better be certain sure, and to be that sure he should ask FDA. If the extruder adds any element to the formulation he can be certain that his customer who uses the plastic is going to ask for an O.K.'d approval from FDA anyhow. The government must theoretically act in 90 days but can extend its action another 90 days, then ask for an amendment to the petition and start the 90-day business all over again. This could go on indefinitely.

It has been reported that one raw materials producer spent over \$150,000 (including food tests) in preparing his petition. But even if he obtains FDA approval for his plastic the processor who uses it cannot use a lubricant, mold release, pigment, or any material that is not exempt or has not already been approved by FDA unless he also petitions for approval, because his customer (food manufacturer) is certainly going to insist that the fabricator has FDA approval.

It has been reported that up to last June 15 only eight petitions had been accepted as in proper form by FDA since last September, only two or three had been acted upon, and several have been extended for 90 days.

There is no indication that government officials intend to be obtuse or difficult in administration of this law, but enforcement of this highly complex statute is a task that would certainly test the administrative ingenuity of the Congressmen who voted for it. It is going to take a long time to learn how to live with it—the alert processor should become familiar with it as soon as possible and prepare to meet its provisions before he becomes involved in a profitless job that gets all tangled up in government regulations.

Another polypropylene plant. Montecatini has registered with the SEC \$10 million of sinking fund general debentures and warrants to finance a plant in the U. S. for the manufacture of polypropylene and other petrochemicals. The new plant is to be located near Charleston, W. Va. The company's PP is now being marketed under the name of Moplen in Europe. The prospectus states that "certain of Montecatini's U. S. patent applications covering PP, with official filing dates in 1954, are subject to interference proceeding in the U. S. Patent Office as a result of conflicting patent applications subsequently filed by certain U. S. companies which are presently engaged either in pilot operations to produce PP or in the production and sales in the U. S. (To page 41)

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HAS REAL "BLOTTER-ACTION" IN PLASTICIZER ABSORPTION...

In coated fabrics, extruded and molded products requiring high concentrations of plasticizer, the "blotter-action" of Vygen 161 gives outstanding results. Its ability to absorb much more plasticizer than ordinary resins makes it an ideal blending resin with which to obtain dry pre-blends containing as much as 60-100 parts of plasticizer.

In addition to its high plasticizer "take-up", Vygen 161 also provides excellent heat stability.

With Vygen 161, heated pre-blenders are not required. Blending cycles are shorter, and the dry pre-mix offers faster fluxing on either open mills or in Banburys.

Color masterbatches are another application for which you should consider this excellent "blotter" resin. Write us today.

TYPICAL ANALYSIS

Form	White Powder
Intrinsic Viscosity	1.03
Specific Gravity	1.40
Bulk Density, gm/cc	0.32
lbs/ft ³	20.0
Volatiles	0.2
DOP Absorption gr/100 gr resin @ room temperature	225

Creating Progress Through Chemistry



THE GENERAL TIRE & RUBBER COMPANY • CHEMICAL DIVISION • AKRON, OHIO

THE PLASTISCOPE

(Continued from page 39)

of a similar product. In the opinion of Montecatini's management, the U. S. patent situation will be resolved in a manner satisfactory to Montecatini."

The Charleston plant will be owned and operated by Novamont Corp. and construction will begin in the second half of 1959. Two years will be required to complete it. Present plans call for an annual capacity of 5000 metric tons (a little over 11 million pounds).

AviSun's new polypropylene film plant. The company's new 10-million-lb. polypropylene film plant will be built at New Castle, Del., instead of at Marcus Hook, Pa., as previously announced in this column. Completion is expected in early fall 1959. A pilot plant for manufacturing continuous filament and staple fibers will also be erected at this location. Nicholas E. Carr, manager of manufacturing—film and fiber for AviSun, will serve as plant manager.

A realignment of the Research and Development Division of American Viscose has resulted in the creation of a Polyolefin Dept. under the management of Dr. John A. Howsmon. Fiber development will be moved into this department under Dr. Robert D. Evans, who succeeds Donald Fiedler, recently transferred to AviSun. Polypropylene film development will also be transferred to this department under the direction of Louis P. Deis.

New film grade resins. In order to give film producers a tough film that will run fast and give good properties, Spencer Chemical has introduced an entirely new series of PE resins designed to give a balance of high clarity and gloss with unusual strength and ease of processing. The material is described as a resin that will "put-thru" the greatest number of pounds per hour per horsepower at the lowest cost. The resins are designated as Poly-Eth 5155, 5165, and 5175. All three have a density of 0.922 with a melt index of 2. They can be used for either blown or flat film.

The resins are the result of new polymerization techniques as is Poly-Eth 3812, a cable jacketing formulation based on a 0.918 density material. It is claimed that this new resin has not failed under any stress-crack testing and is one of the few approved by Western Electric for certain applications.

Lexan plant in Indiana. General Electric Co. has announced acquisition of land and plans to build a plant for production of Lexan polycarbonate near Mt. Vernon, Ind. on the Ohio River. Development work and business headquarters will remain in Pittsfield, Mass. Production is expected to be under way during the latter part of 1960. Lexan has been produced in a pilot plant for the past year and a half. It is a derivative of phosgene and bis-phenol A. It is the first commercial plastic material built from organic units in which the molecules are joined by a carbonate linkage, and is the first of what will become a new class of plastic materials.

It is expected to become useful in such fields as molding, extrusion, film, coatings, fibers, fluids, and elastomers. The present polycarbonate is designed as a molding material. It has good low temperature properties, is an excellent insulation material, is stable at temperatures of from below -100 to 250° F. and is self-extinguishing. It is chemically resistant (To page 43)

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...you can make **POLYETHER FOAMS** that are **SELF-EXTINGUISHING**

Major Applications

High and Low Temperature Insulation

refrigerators
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Flotation Equipment and Installations

boats
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Core Materials

building panels
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Encapsulation

Now, at the same cost as ordinary polyether prepolymers, Pelron brings you Resin #9665—a resin from which you can make rigid foams that are fully self-extinguishing or even totally non-burning!

Polyether #9665 requires no additives to give it its unique freedom from fire hazard. It is self-extinguishing because of its internal molecular nature. And, it is as easy to use as any regular polyether prepolymer, demanding

no stirring as is the case with polyethers depending on various additives for self-extinguishing characteristics.

Flame impingement merely causes charring—with a complete absence of dangerously dripping, sputtering hot materials.

Suitable for both free-foaming and molded applications, #9665 can be controlled to yield foams ranging from 1.8 lbs./cu. ft. upwards.

Write for complete information.

PELRON CORPORATION

7847 W. 47th Street • Lyons, Illinois

THE PLASTISCOPE

(Continued from page 41)

to acids but not to alkalies. An example of its hardness is a molded part now used on the leading-edge surface of a new military airplane, where light transmission, unbreakability, and resistance to heats generated by supersonic speeds are required. Its impact strength, notched Izod, is 12 to 16 ft. lb./in., which is far higher than most other plastics. Its mold shrinkage is 0.005 to 0.007 in./in., which makes it one of the lowest.

Vinylfoam plant expansion. Union Carbide Plastics has moved office and manufacturing facilities of its molded Vinylfoam operation to 796 Frelinghuysen Ave., Newark, N. J. A new molding line for reversible, contoured molded Vinylfoam furniture cushions, with a capacity of 500 lb. per hour, has been installed. Around 20 furniture manufacturers are now using this material. International Furniture reported that the company's usual ratio of 65% foam rubber and 35% springs was upset to 40% molded Vinylfoam, 40% foam rubber, and 20% spring-cotton.

"Breathing" film by Plax. Oriented polystyrene film for overwrapping fruits, vegetables, and other produce has been announced by Plax Corp. This Polyflex film is 1 mil in thickness and allows a limited passage of moisture which prevents unsightly fogging inside the wrap. It allows oxygen to enter and carbon dioxide to escape, which makes it unnecessary to perforate the package. According to the producer, this film will not change color, become brittle, or go limp. Plax states that it costs 20 to 40% less than other transparent films. The film is now being used for tomatoes and is a possibility for lettuce.

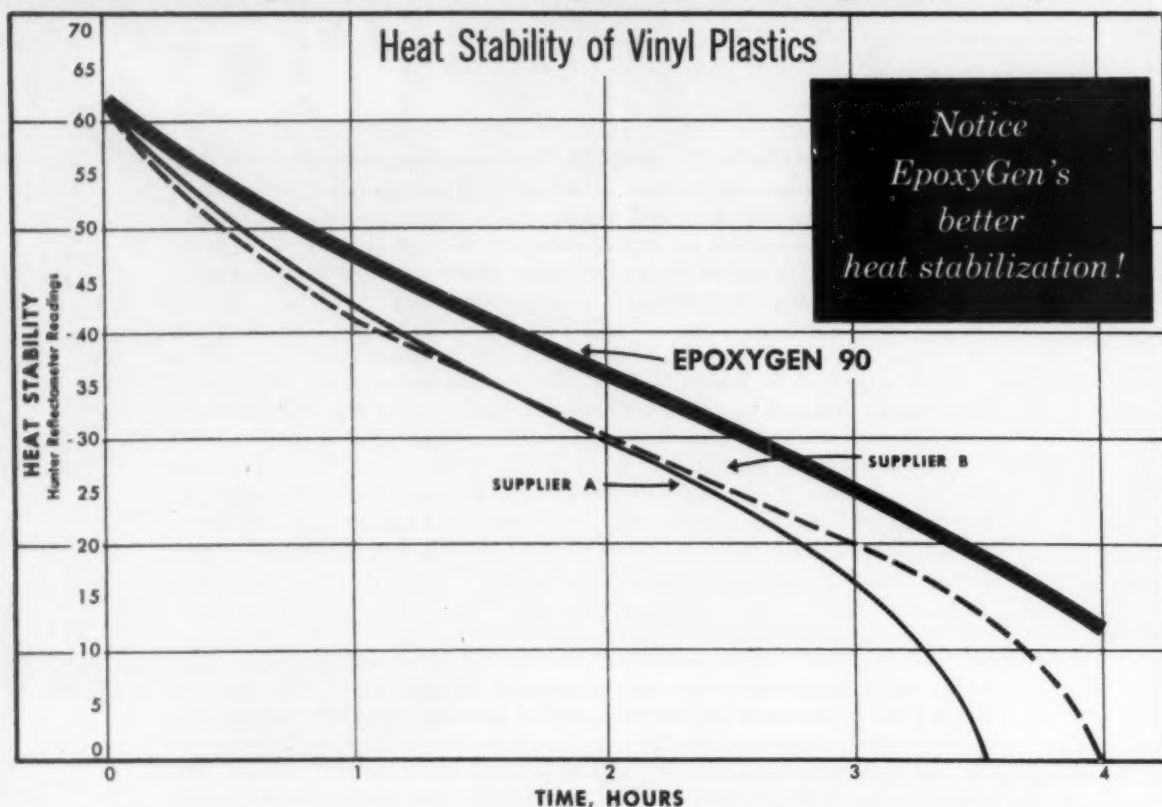
Price reduction for Penton. A plastic has been reduced at one fell swoop by \$2.50/lb., which is probably a record reduction. The plastic is Hercules' Penton, derived from pentaerithrytol. It was formerly \$6.00/lb. and is now \$3.50 for natural in 6000-lb. quantities and \$3.75 in olive drab and black. It provides excellent corrosion resistance, particularly at elevated temperatures, and is already established in its field as a result of five years' development. It can be formed by compression or injection molding; fabricated from sheet, rod, or block stock; and applied as a coating on metal surfaces. See page 174.

Vinyl floor covering on the boom. Resin for use in floor coverings has grown from 81 million lb. in 1957 to over 114 million in '58 and an estimated 145 million in '59. First quarter consumption in 1959 was 36 million lb., compared with 24 million in the first quarter of '58, and 31 million in the last quarter.

The boom is being accompanied with a rash of expansions by floor covering producers. Goodyear has announced a multi-million-dollar addition to double its capacity with completion by April 1960 in Akron, Ohio. A 27-in. width roll has also been added to the company's counter top line to meet consumer demand for narrow widths. Five new gold metallic floor-covering patterns in either 9 by 9 tile or 45-in. rolls have also been added.

Among other expansions announced this year were a 33% increase by Johns-Manville in a plant at Chillicothe, Ohio, and (To page 45)

General Mills' new plasticizing stabilizer for vinyl resins sets a new high standard of quality and dependability!



EpoxyGen's[®] guaranteed high epoxy content makes vinyl plastics 25 to 40% more heat-stable at no extra cost.

EpoxyGen provides up to 10% higher epoxy content than other epoxidized soybean oils on the market today! Its higher epoxy content and inherently better color stability combine to give superior heat stability!

This means you can either:

- reduce the amount of your stabilizer
- increase your production by operating at a higher temperature
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EpoxyGen contains up to 50% less impurities and has 50% lower viscosity. It is available in regular grade *EpoxyGen 80* (85% epoxy*, minimum) or premium grade *EpoxyGen 90* (90% epoxy*, minimum).

*% of theoretical—Basis: Iodine value of starting oil = 130

Prove to yourself that EpoxyGen:

- provides greater stabilization
- is more compatible
- has less tendency to spew
- is more uniform

Write today for this new technical brochure describing EpoxyGen, and samples of EpoxyGen 80 and 90.

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2010 East Hennepin Avenue,
Minneapolis 13, Minnesota



THE PLASTISCOPE

(Continued from page 43)

an unannounced increase by Kentile on the West Coast. Armstrong Cork has added 46 new patterns and is emphasizing sheet-type flooring and three new styles of vinyl cork tile. Last year Mastic Tile, with four plants, announced a hook-up with Air Reduction to produce vinyl resin for tile.

Vinyl asbestos tile is still gaining on asphalt. Volume is difficult to ascertain since V.A. is furnished in $\frac{1}{16}$, $\frac{1}{8}$ and $\frac{3}{32}$ in. thicknesses while asphalt is all in $\frac{1}{8}$ -in. thickness. About 10% of vinyl asbestos is thought to be $\frac{1}{16}$ inch. The total volume compared with asphalt is thought to be over one-third. Most asphalt producers also make vinyl asbestos and are promoting it enthusiastically. It is more colorful and more profitable.

It is estimated that homogenous vinyl flooring resin consumption will be 7 or 8 million lb. more in '59 than in '58. Resin used is estimated to be 30 to 35% less than that used in vinyl asbestos though it requires much more per sq. foot. Biggest growth has been in the .080-in. thick material in contrast to the thicker and older .125 or $\frac{1}{8}$ in. thick material.

The largest percentage increase is probably in the vinyl topped felt base flooring which is the lowest cost of vinyl floor coverings and competes with enamel coated felt base. It generally consists of a dispersion produced printed sheet which is coated with a transparent coating to protect the printed surface and laminated to felt.

Dow activity in polyolefins. The company has announced doubling of its high-pressure polyethylene capacity by adding another plant at Freeport, Texas where the capacity of the original plant was doubled last fall. Dow has not stated the amount of capacity involved but estimates on the original plant were around 25 million pounds. If this estimate is true Dow has a capacity of around 100 million lb. at Freeport now in operation. But that isn't all. The company also announced that when the new plant came on stream another PE plant was started at the company's Louisiana Div. near Plaquemine which would be completed in about 18 months. The company is also building a low-pressure PE plant in Bay City, Mich. Incidentally the Plaquemine site will also be the location of a new plant for production of vinylidene chloride which is copolymerized with vinyl chloride to produce saran.

To further their interests in PE, Dow has also announced a new PE film plant near Fresno, Calif. with 100 employees to be completed early in 1960, and together with Pacific Chemical & Fertilizer Co. of Honolulu will build a PE film plant at that location to be known as Hawaiian Extruders, Inc. with about 15 employees. The latter company's president is R. Q. Smith who is also president of Pacific Chemical & Fertilizer. W. B. Sander, president of Extruders, Inc. at Hawthorne, Calif., a subsidiary of Dow, will be manager of the California plant and relocate Extruders in Fresno. A third new Dow PE film plant will also soon be in operation at Findlay, Ohio where the company has purchased the vacant building constructed by National Automotive Fibres in 1947. The plant contains 208,000 sq. ft. of space and initial employment will be about 100 persons. Dobeckmun, a Dow subsidiary, will assist in planning.

For additional and more detailed news see Section 2, starting on p. 174

LETTERS TO MODERN PLASTICS

Where readers may voice their opinions on any phase of the plastics industries. The editors take no responsibility for opinions expressed.

Mr. Space Age comes to plastics

Enclosed is a picture of Dr. Werhner von Braun (left), and Mr. Elmer P. Warnken, President of C. T. L., Inc., taken on the occasion of Dr. von Braun's recent visit to CTL's facilities in Cincinnati, Ohio. Since Dr. von Braun is probably one of the most newsworthy individuals in the country, there is certainly nothing unusual about this photograph of him. However, we feel that this particular photograph has spe-



cial significance for the plastics industry. In the minds of most Americans, Dr. von Braun has become, and justly so, an individual symbol of the missile and space age on whose threshold the entire world now stands. To the best of our knowledge, the recent visit of Dr. von Braun to our facilities marked the first occasion on which he had ever, on a technical basis, visited an organization devoted strictly to the plastics field. To us, therefore, this picture symbolizes the fact that the reinforced plastics industry, after years of struggle, is now accepted as an integral part of our new space and missile industry.

J. D. Flynt
Assistant to the President
C. T. L., Inc.
Cincinnati, Ohio

For its work in developing the first successful reentry nose cone for America's first operational Intermediate Range Ballistic Missile, C.T.L. has just won the Annual Space Industries Small Business Award.—Ed.

Squeeze on plastisol makers

The use of plastisols for consumer products and in industry is growing at an ever increasing rate. But the people who developed this particular industry, the commercial formulators, are being squeezed out of the market. They are being crowded out

of normal growth in a growing market by suppliers and customers. There has been a definite trend on the part of established plastisol users to make their own compounds. New plastisol users have been influenced to "do-it-themselves" rather than buy their requirements from formulators.

Why has this squeeze been put on plastisol compounders? Here are some of the reasons:

1. Some plastisol compounders have failed to provide products and services at an equitable price.

2. Companies having captive plastisol production have failed to weigh honestly the costs of their installations against the services provided by the plastisol formulator.

3. The marketing policies of vinyl resin and plasticizer manufacturers have not tended to discourage the "do-it-yourself" market.

True, some plastisol formulators have priced themselves out of their markets. Others have supplied inferior products. But most plastisol formulators have supplied quality goods at reasonable prices.

The "do-it-yourself" bug hits any industry with extra force during times of economic recession. This was particularly true of plastisol purchasers during the early part of 1958. The extremely dangerous part of this tendency (and it is dangerous to the plastisol user as well as to his supplier) is that the "do-it-yourself" process is seldom a reversible procedure. Once a user starts to make his own plastisol, even though he does not realize the savings he at first thought he would, he seldom admits his mistake and goes back to buying plastisol again.

Some companies have made studies which show that they can save by manufacturing their own compounds. But, how good are such studies? How many more expenses that have not been foreseen will occur when the "do-it-yourself" process starts?

Switching from buying plastisol to producing it for one's own needs involves hundreds of hidden costs. For instance, consider the functions of the purchasing department alone. When the company was buying its plastisol, it interviewed salesmen from the primary plastisol vendors. When the "do-it-yourself" starts to make his own plastisol, Mr. Purchasing Agent must interview repre-

sentatives from half a dozen resin sources, a score or more plasticizer suppliers, stabilizer people, and so on. He must be conversant with more markets and more materials. His job is compounded. How much of this increased cost is shown in the cost study made prior to deciding?

And what about the resin and plasticizer suppliers? To be bluntly objective, the policies of these firms are primarily responsible for the plight of all independent plastisol compounders.

It is the policy of vinyl dispersion resin suppliers not to refuse to help put their own customers out of business. It is not peculiar to any few resin or plasticizer suppliers, but the policy throughout the industry.

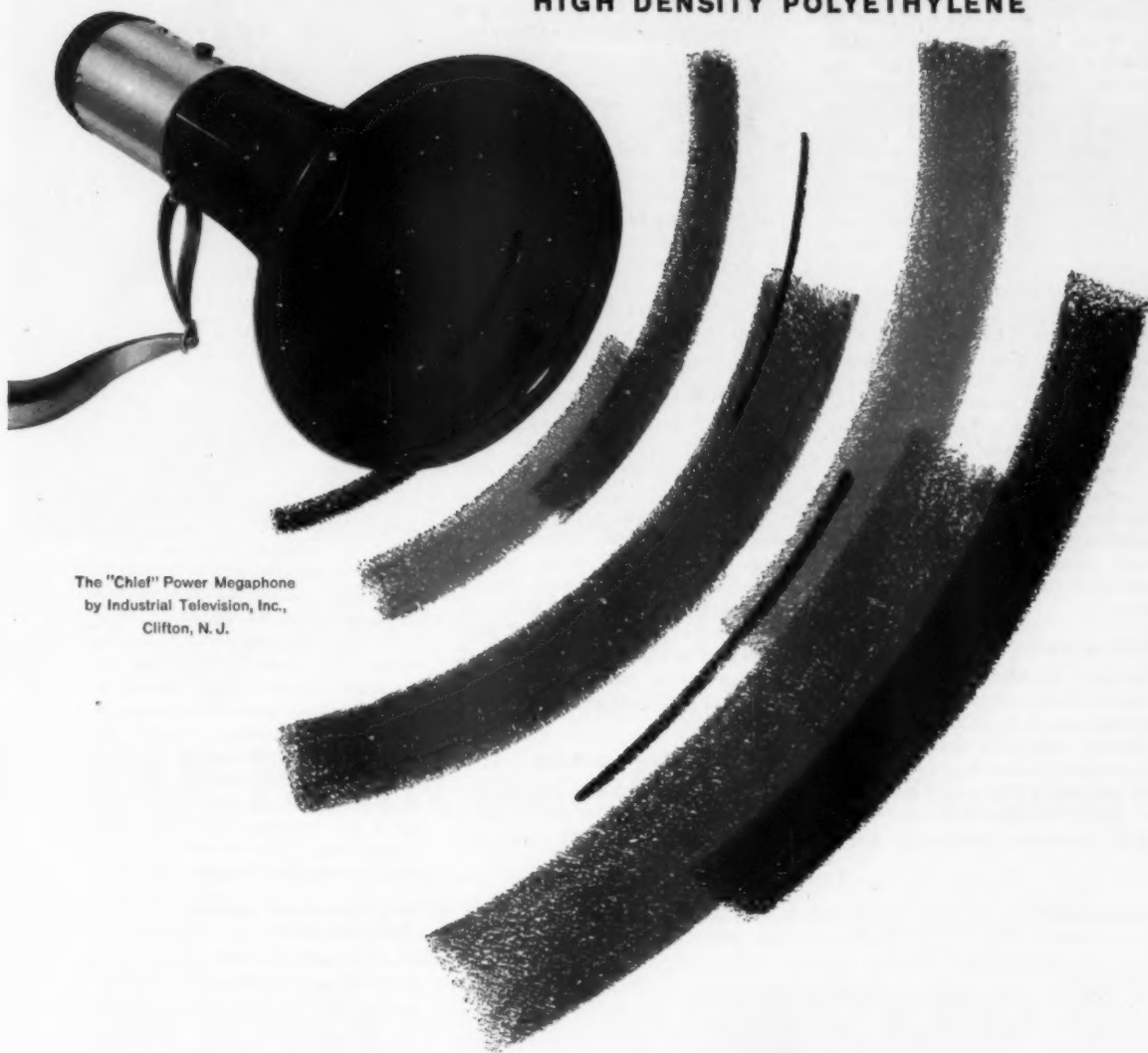
Dispersion resin suppliers underline this policy by pricing schedules which promote the "do-it-yourself-er." Price schedules offer little premium for less than carload purchases, and no savings for purchasing large quantities of resin. The same price prevails whether one carload or one hundred carloads are purchased. This obviously encourages people who are not specialists in plastisol to start thinking about compounding their own material.

Other sales policies based on such a lack of appreciation for the plastisol compounders are practiced universally by resin suppliers. Technical representatives regularly call on their customers' customers, not with an eye to helping their customers sell their product, but rather to be on hand should the plastisol user decide to make his own plastisol.

Where does this depressed situation leave the plastisol formulator in the years to come? Unless the factor which is currently having the primary impact on the situation (i.e., the marketing policies of all the resin and plasticizer manufacturers) is modified, the role of the formulator within a few years, will be limited to supplying short run specialty formulations. The formulator may also supply captive products where he has been able to obtain and maintain an obvious product advantage in the face of competition from his legitimate competitors, and his customers and suppliers as well.

V. B. Chamberlain, Sales Mgr.
The Stanley Chemical Co.
East Berlin, Conn.—End

Packs brilliant power...
works in any weather...amazingly light...
made of **GREX**[®]
HIGH DENSITY POLYETHYLENE



The "Chief" Power Megaphone
by Industrial Television, Inc.,
Clifton, N. J.

The human voice can be projected enormous distances with this new, self-contained "Chief" power megaphone. Yet the entire unit—components and casing together—weighs under four pounds!

Why was GREX chosen for the casing? Industrial Television, Inc. gives three principal reasons:

GREX high density polyethylene makes a rugged lightweight molding, rigid and unyielding. GREX is weatherproof, rustproof, corrosionproof. Great heat or cold can't harm it. Thus the megaphone can be used where the going is rough: fires, police emergencies, storms . . . as well as on

boats, athletic fields, beaches, playgrounds. And it's available at an attractively low price, thanks in part to this versatile plastic.

New markets can open for *you*, when GREX comes into your production picture. It costs nothing to learn how. Why not inquire today?

W.R. GRACE & CO.
POLYMER CHEMICALS DIVISION

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NEW MACHINERY-EQUIPMENT

Specifications, claims made, and prices appearing in these pages are those of the manufacturers or sellers of the machinery and equipment described, or their agents.*

High-speed 12/16

The Model 3220-125 is a 12-to-16-oz. injection molding machine with adjustable plunger speeds up to 371 in./min. that gives injection rates up to 24 cu. in./sec. with the standard 20,000-p.s.i. ram, up to 15.7 cu. in./sec. with the 30,500-p.s.i. optional ram. (Injection capacity is 8 oz. per stroke with smaller ram.) Clamping specifications are identical with those of other 3220 models described in this Department in July, 1958. Higher speed has been accomplished by using a 30-hp. pumping system that delivers 62 gal./min. at 2000 p.s.i. line pressure. This brings the dry-cycle time (min.) down from about 9 sec. to 5.1 seconds. Plasticating capacity, also, has been raised, from 150 to 200 lb./hr. of polystyrene. Standard features include automatic stuffing, adjustable prepositioning, high-speed plunger prefill (48 cu. in./sec.), weigh feeder and other instruments. Optional features include equipment for "impulse" molding, low-pressure mold closing, core puller, nylon shut-off valve. *Lombard Governor Corp., Ashland, Mass.*

Roll slitter

The Lev-Air-Matic 500 single-knife slitter automatically slits all thermoplastic films in the roll, has been successfully used with foils, too. It has been used to make cuts as narrow as 35 mils apart. The model shown has a rotary, high-carbon-steel knife with automatic sharpening, but a

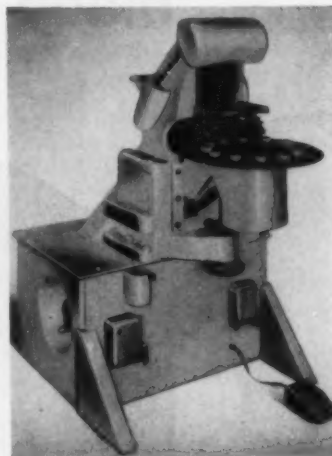
turret attachment for straight knives is available for cutting pressure-sensitive tapes. Cuts are made in from 2.5 to about 6 sec., depending on gap width; in a polyethylene roll of the maximum diameter of 11.5 in., cuts 1 in. apart would be made in about 5 sec. per cut. The standard machine accommodates rolls up to 55 in. long, special models handle longer rolls. Spindle, knife, and sharpener are electrically powered. Knife advance requires about 0.1 cu. ft. of 40-p.s.i. air per cut. The chuck operates with one twist, no wrenches. Operation is so foolproof that material waste is minimized and one operator can operate two machines at once. *Lever Mfg. Co., Inc., 120 W. 31st St., New York, N. Y.*

Injection nozzle heater

The Thermatube nozzle heater, totally enclosed in a stainless steel shell, was especially developed for molding nylon and other materials requiring high nozzle temperatures. It has extra-high wattage, long, cold, bendable leads, is designed for extremely long service life. Armored flexible leads are available at extra cost. The new heater is available in many stock sizes, wattages, and voltages. *Thermel, Inc., 9400 Robinson Rd., Franklin Park, Ill.*

Hot stamping machine

A foil-marking press with a circular table, known as the Timadco 25, can mark up to 7200 pieces per



TIMADCO 25, a foil-marking press with a circular table, is designed to mark up to 7200 pieces per hour.

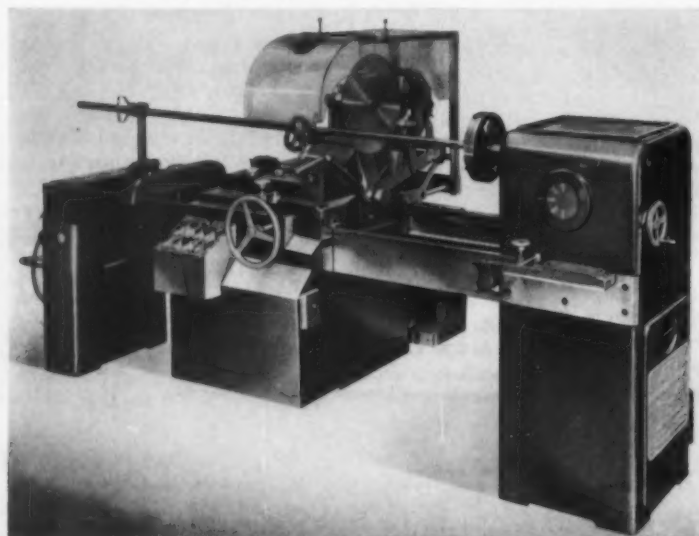
hour. The table can be indexed to 6 or 12 positions, permits marking pieces in pairs or with two colors, is readily adapted to mechanical or pneumatic unloading. The head is mechanically driven by a $\frac{3}{4}$ -hp. motor which also indexes the table by means of a Geneva drive. Dies are mounted directly to the heated 4-by 8-in. platen with a thermosetting adhesive, eliminating chases. Die temperature is thermostatted and a thermometer indicates die temperature. Table may be adjusted as much as 6 in. vertically, moving along ground ways. *The Rainville Co., Inc., 657 Franklin Ave., Garden City, N. Y.*

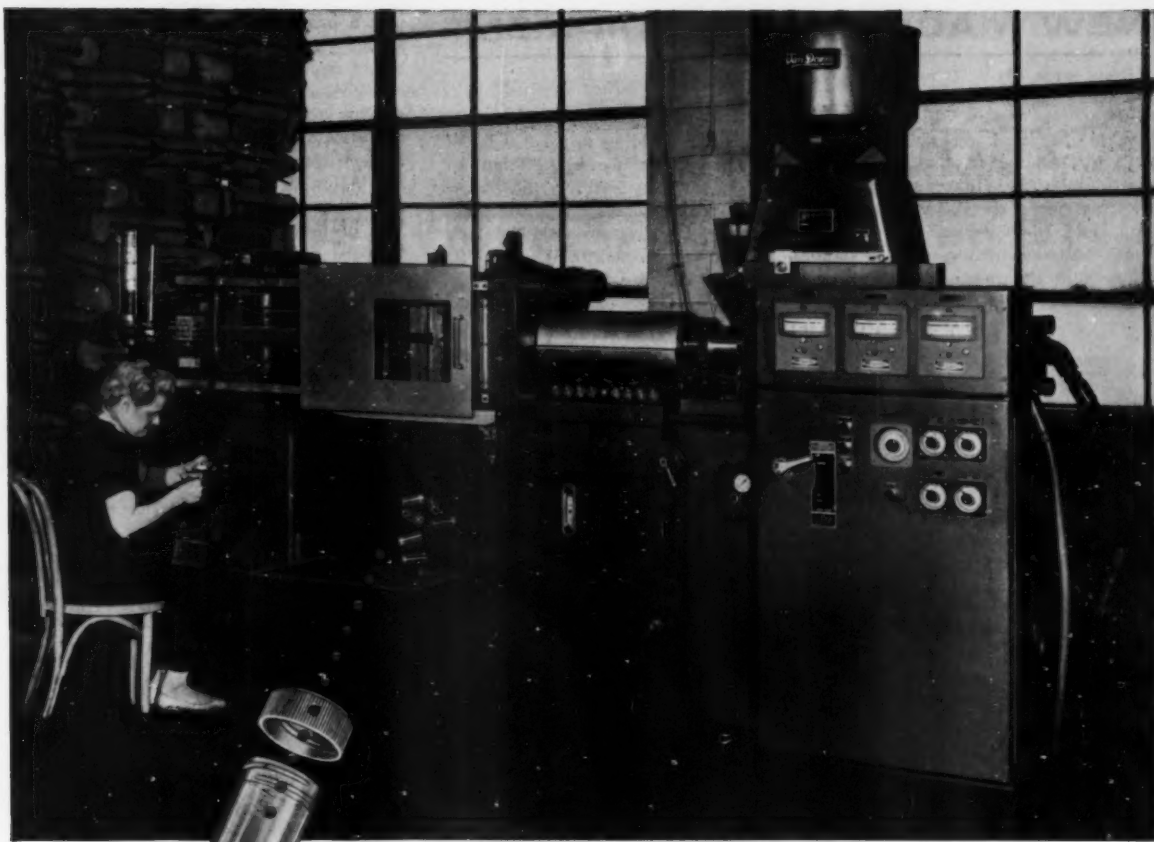
High-pressure sheet thermoformer

The Pressure-Vac Mark II can form up to 30 sq. ft./min. of any thermoplastic film or sheet. In particular it easily forms oriented materials. Unless the sheet material is rather thick, forming cycles are likely to be only one-fourth as long as with conventional drape or vacuum forming. Heating is by direct contact rather than radiation, and the heater may be positioned either above or below the plastic. Forming is accomplished with pressures (To page 50)

*Prices are deemed to be F.O.B. sellers' plants (unless otherwise stated), are for "standard" models, and are subject to change without notice. The publishers and editors of *MODERN PLASTICS* do not warrant and do not assume any responsibility whatsoever for the correctness of the same, or otherwise.

LEV-AIR-MATIC 500 single-knife slitter automatically slits all thermoplastic films in the roll; also used successfully with foils.





Styrene containers produced on H-400 press. Polyethylene closure produced on the versatile Van Dorn H-260.



Proved Performance

in the field by

VAN DORN model H-400 4-6 oz. press

Van Dorn Model H-400 press owners are reporting excellent results in their operations. For example, De Mar Products, Inc., 1317 Chesapeake Avenue, Columbus 12, Ohio, produces the styrene medical specimen containers illustrated with a *hot runner mold*. De Mar management says the Van Dorn press provides fast, dependable, fully automatic production.

This operation is a typical example of Van Dorn's unique "Package Service" for customers.

De Mar had a well conceived idea for a plastic part, but no experience in molding. They came to Van Dorn, whose engineers helped them procure a well-designed mold from a competent mold maker, and then checked the operation of the finished mold in the Van Dorn factory at no charge.

Such Van Dorn "Package Service" insures satisfaction, helps produce profits. *It is available to you also.*

Write for folder on Model H-400 Press



NEW MACHINERY-EQUIPMENT

(From page 48)

up to 150 p.s.i. on areas up to 11.5 by 21.5 inches. Cycle is automatic with five timers controlling heating, heater dwell, forming, cooling, and air blow-off. A remote push-button control permits operation from the indexing or cutting station. A useful accessory is an



PRESSURE-VAC MARK II
high-pressure sheet thermoformer can form up to 30 sq. ft./min. of any thermoplastic film or sheet.

automatic indexer that lifts formed sheet from the mold and transfers it to the next operation while indexing new material into the forming zone. Simultaneous forming and cutting can be done, too. *The Auto-Vac Co., 740 Railroad Ave., Bridgeport, Conn.*

Welding rod

Kamlar welding rod for hot-gas welding of plastics is now available from the makers of Kamlar welding guns. Developed after a study of all previously available rods, these rods are said to be free of voids and held to close dimensional tolerances. For PVC Types I and II, 48-in.-long rods are offered in $\frac{1}{8}$ -, $\frac{3}{32}$ -, and $\frac{1}{16}$ -in. diameters. Linear polyethylene rods are available in the $\frac{1}{8}$ -in. diameter only. Rods are conveniently packaged in 2.5-, 5-, and 25-lb. bundles. *Laramy Products Co., Box 8, Hingham, Mass.*

Drum tumbler

The Tumble-Master Deluxe is designed to handle simultaneously two drums up to 24 in. across by 37 in.

deep, each holding up to 300 lb. of material to be blended. Beefed up throughout, it features the floor-level loading, jogging, and fast positive locking of the original Tumble-Master. *Ball & Jewell, Inc., 24 Franklin St., Brooklyn 22, N. Y.*

Heating cylinder

In a startling reversal of recent trends, IMS is offering undercapacity replacement heating cylinders for most recent injection molding machines. The oversize heaters that are standard equipment with many new injection machines have in some cases contributed to burning, streaking, and discoloration because of over-long residence of material in the heated zone, and have increased the cost of purging. The new undersize cylinders, it is claimed, are constructed to permit precision control of material temperature where oversize heaters periodically overheat or degrade the plastic. *Injection Molders Supply Co., 3514 Lee Rd., Cleveland 20, Ohio.*

Dispersion nozzle

Dow engineers have recently developed an extremely simple injection molding nozzle that yields excellent color dispersions from dry-blended polyethylenes. As the drawing shows, a single hole of special design is used. The rather abrupt entrance to the hole is an important factor contributing to the goodness of dispersion. Recommended dimensions: diameter of orifice should be about $\frac{1}{4}$ that of bore, and approach radius R should be $0.5D_1$. In machines over 48 oz. in capacity, the best orifice diameter may be even less than $D_1/7$. Land length L should be in the range 0.040 to 0.125 in., keeping in mind

that a balance must be struck between pressure drop across the orifice and strength. The outlet diameter A , as usual, should be slightly smaller than the sprue diameter and should be designed as shown to achieve top strength. Samples molded with this nozzle seemed to be about evenly colored as the best of those shown in the article "Molded dry-colored polyethylene," *MPL*, July 1958, p. 97. If the orifice dimensions are sized to fit the flow properties of the particular plastic being molded, the dispersion nozzle should give good results with other materials; it has performed well with several styrene polymers.—*J.F.C.*

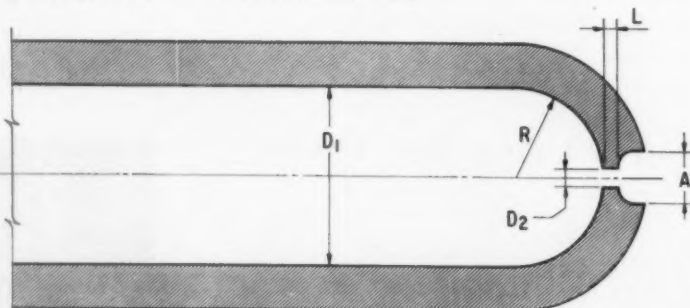
Screen printer

The Markem Model 112S screen process printer is designed to give maximum ink coverage and uniformity of entire imprints along with accurate registration of all colors in a multi-color imprint. It will mark objects (such as children's boots, containers, toys) up to 23 in. square, with a maximum imprint of 12 by 12 inches. A dual ink squeegee assures best uniformity, and a flood stroke, when desired, gives more opaque coverage. Up to 20 pieces per minute can be printed. The machine is air-operated, using 60-p.s.i. air and electrically controlled. Screens, inks, and machine accessories are also available. *Markem Machine Co., Keene 80, N. H.*

Barrel finisher

Roll Barrels are a finishing system in which the barrels, instead of being mounted in frames and separately driven, are simply allowed to rotate on two driven rubber rollers. Barrel speed is determined by motor speed and by the size of the barrel; nine sizes are available, providing speeds from 17 to 65 r.p.m. Parts and media are loaded and unloaded in a convenient separating cabinet; barrels are handled on the rollers with a built-in mechanical (To page 52)

DOW polyethylene color dispersion nozzle design.





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NEW MACHINERY-EQUIPMENT

(From page 59)



ALMCO roll barrels, showing one-half single-row unit at right, double-row unit at left, with hoist, loading station.

hoist boom. One operator can handle two machines, processing up to 12 different barrels simultaneously. The units are available in single- or double-row arrangements, depending on floor-space availability. **Almco**, Queen Products Div., King-Seeley Corp., Albert Lea, Minn.

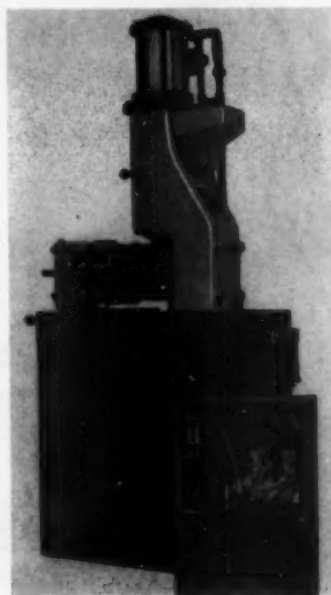
Blow-molding machine

Containers, toys, and other hollow items up to 6 in. in diameter and 32 in. long can be blow-molded with the Model 150-7 Auto-Blow ma-

chine. Up to 140 lb./hr. of material from a continuously running extruder (an integral part of the blow molder) can be molded. Two pairs of molds are used and are supplied by four extruder heads. Parisons are extruded into one pair of molds while the other pair is cooling, thus gaining half the cooling time with no lengthening of the cycle. Up to 2500 molding cycles per hour are possible. According to the maker, most products require no secondary finishing operations. Operating controls include press action for opening and closing the molds, timers, and screw-speed regulator. Once on cycle, one operator can handle as many as three machines, which are sold without royalty restrictions. (See diagrams, below). **Auto-Blow Corp.**, 401 Bishop Ave., Bridgeport 10, Conn.

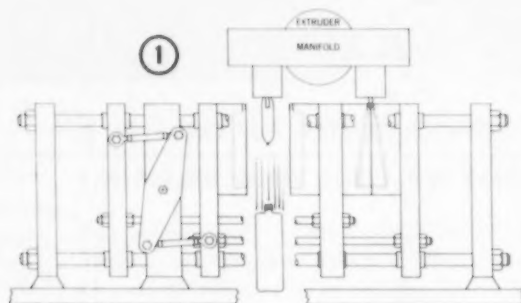
Small injection machine

The model 60PC85 Mini-jector uses air power for both injection and mold closing, achieving about 10 tons of clamping with 100-p.s.i. line pressure. Shot capacity is $\frac{3}{4}$ ounce. Clamping is horizontal, accepts molds up to 6 by 5.1 by 5 in. that are bolted to the platens. Mold halves ride on four hard-chromed

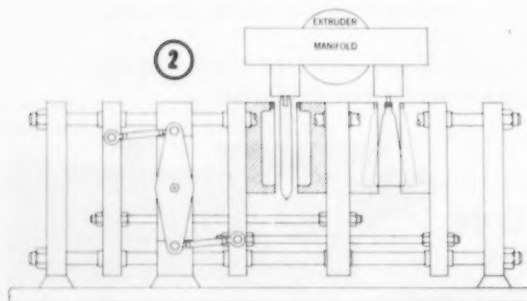


NEWBURY model 60PC85 Mini-jector uses air power for injection and mold closing. Shot capacity is $\frac{3}{4}$ ounce.

tie-rods, as in larger machines. Since the machine is controlled by push-button-operated solenoid valves, it is easily converted to semi- or fully automatic operation. **Newbury Industries, Inc.**, Newbury, Ohio.—End

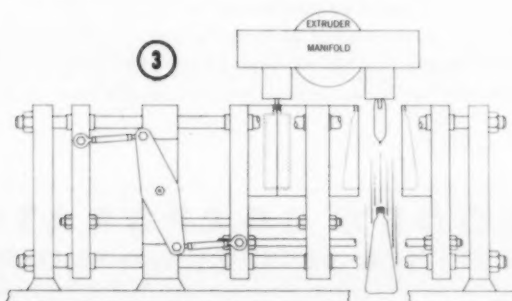


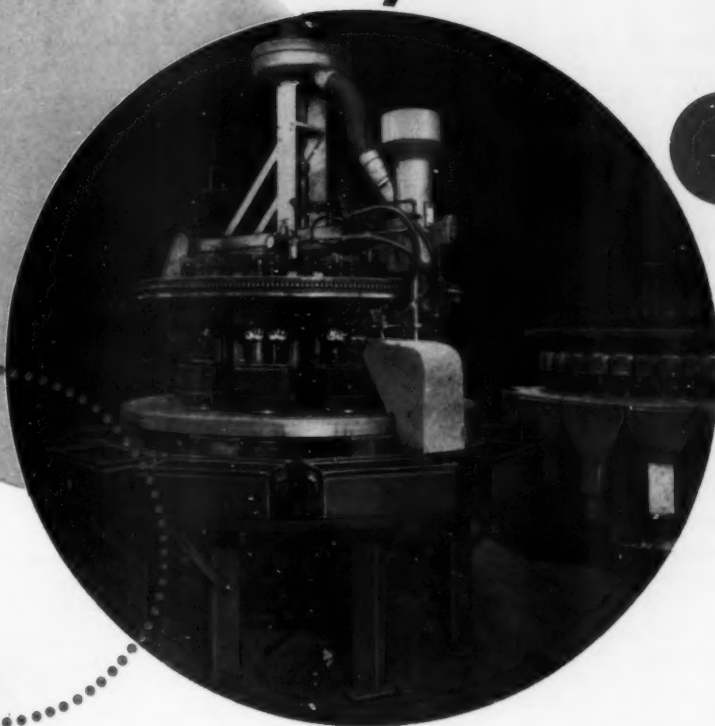
1—Extruded tubes are fed between open halves of both left side molds as blown bottles are ejected. A specially designed valve on the extruder head synchronizes material feed with molding cycle. Right side molds are closed for blowing and cooling operation. Since the molding air pressure is fed from the extruder head, it is not necessary for the parison to fit over a bottom mandrel.



2—Timer is adjusted so that as parisons reach correct length the molds on the left side begin to close. Molds on right automatically open and molded parts will be ejected.

3—When molds on left are completely closed, molds on right are open and the hot parisons are extruded as blown bottles are ejected. When the left side has cooled, the parisons on the right reach the correct length and the cycle will automatically repeat.





AUTOMATIC ROTARY PLASTIC MOLDING PRESSES

10- or 30-Station Machines

- Low cost simple molds
- Machine easily installed
- Simple ejection of parts
- Easily maintained
- Maximum flexibility
- Fully automatic compression molding
- Hopper feed – the supply rotates
- Adjustable production cycle
- Adjustable temperature in mold holders
- Low cost molding for small quantities
- Molds changed without production interruption

For descriptive bulletin or opportunity to
see these machines in operation, contact

NEW ENGLAND BUTT CO.

Division of Wonskuck Co.

304 Pearl Street • Providence 7, R. I.

U.S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C. at 25¢ each.

U.S. Pats., Mar. 10, 1959

Stabilized polyurethanes. P. A. Roussel (to Du Pont). 2,877,193.

Modified oil copolymers. J. C. Konen and R. A. Boller (to Archer-Daniels-Midland). 2,877,194.

Vinylate fatty acid ester interpolymers. J. W. McNabb (to American Can and Kienle). 2,877,195.

Alkyd resins modified with alkoxy-polyisiloxanes. M. M. Olson (to Pittsburgh Plate Glass). 2,877,202.

Polyvinyl halide, oxidized polyester resin composition. A. K. Forsythe and J. A. Parker (to Armstrong Cork). 2,877,203.

Flame-resistant polyester. G. B. Duhnkrack and C. H. Gugliss (to American Cyanamid). 2,877,204.

Methyl methacrylate, 2-butene-1,4-diol dimethacrylate copolymer. J. Lal (to H. D. Justi). 2,877,205.

1-Olefin polymer, conjugated diene polymer blend. J. N. Scott (to Phillips). 2,877,206.

Fluorinated acrylic polymers. R. P. Cox and L. L. Yaeger (to Bjorksten Research). 2,877,207.

Tetrahydropyran methyl acrylate polymers. J. Lal (to H. D. Justi). 2,877,208.

Sulfur-containing curing agents for silicones. S. Nitzsche, S. Reichstaller, and M. Wick (to Wacker-Chemie). 2,877,211.

Polyurethanes from difunctional polymers of conjugated dienes. K. L. Seligman (to Du Pont). 2,877,212.

Polymerization of thiovinyl ethers. M. H. Opheim and B. Franzus (to Phillips). 2,877,214.

Phosphoric acid reacted with a di-oxolane ester-unsaturated monomer copolymer. J. C. Fang (to Du Pont). 2,877,215.

Poly-N-vinyl carbazole. H. Fikentscher and R. Fricker (to Badische Anilin). 2,877,216.

Polymerizing halogen-substituted ethylenes. B. R. Thompson and D. M. Young (to Union Carbide). 2,877,217.

U.S. Pats., Mar. 17, 1959

Purification of polyvinyl acetate. W. B. Tanner and J. R. Wesel (to Du Pont). 2,878,168.

Irradiation of polyethylene. W. C. Rainer, E. M. Redding, J. J. Hitov, A. W. Sloan, and W. D. Stewart (to W. R. Grace). 2,878,174.

Isomerizing polybutadiene with ultra-violet radiation. M. A. Golub (to Goodrich). 2,878,175-6.

Making cellular vinyl aromatic polymers. L. C. Rubens (to Dow). 2,878,194.

Organopolysiloxane. D. T. Hurd (to General Electric). 2,878,195.

Phenol-aldehyde resins esterified with fatty acids. R. A. Mohr and E. L. Capener (to General Mills). 2,878,199.

Stabilized polyacrylonitrile. R. R. Holmes and L. T. Jenkins (to Chemstrand). 2,878,200 and 2,878,202-31.

Polyester composition. A. B. Beindorf and H. D. DeWitt (to Chemstrand). 2,878,201.

Vinyl aromatic polymers, synthetic rubber. W. K. Schweitzer, Jr. (to Dow). 2,878,232.

Epoxy resin diimidazoline curing agents. S. A. Harrison (to General Mills). 2,878,233-4.

Polyamides of m-xylylene diamine and aliphatic dicarboxylic acids. J. C. Butler, F. G. Lum, and E. F. Carlson (to California Research). 2,878,235.

Lactone polyesters. D. M. Young, F. Hostetler, and R. W. McLaughlin (to Union Carbide). 2,878,236.

Polymerization of acrylics. W. N. Russell and T. J. Suen (to American Cyanamid). 2,878,237.

Purifying polyvinyl chloride. W. A. McMinn and J. T. Barr (to Es-cambia). 2,878,239.

Polymerization of olefins. L. Schmerling (to Universal Oil). 2,878,240.

Polymerization of ethylene. A. Schneider (to Sun Oil). 2,878,241.

U.S. Pats., Mar. 24, 1959

Surface treatment of polyethylene. L. E. Wolinski (to Du Pont). 2,878,519.

Forming hollow plastics. G. V. Mumford and L. D. Soubier (to Owens-Illinois). 2,878,520.

Sulfonated polyethylene. J. A. Nelson, Jr. and W. K. Vollmer (to Union Carbide). 2,879,177.

Foamed polyurethanes. H. A. Pace (to Goodyear). 2,879,233.

Thermoplastic particles coated with conductive gel. M. A. Coler. 2,879,234.

Destaticized resin. M. A. Coler. 2,879,244.

Diisocyanate-polyester and vinylidene copolymer. G. Nischk, K. Muller, and L. Goerden (to Bayer). 2,879,248.

Crosslinked polyurethane. G. Eisenmann, G. Nischk, and H. Holschmidt (to Bayer). 2,879,250.

Accelerator for diisocyanate resin. N. V. Seeger and T. G. Mastin (to Goodyear). 2,879,251.

Copolymers of acrylonitrile. H. W. Coover, Jr. (to Eastman Kodak). 2,879,253.

Heat-stabilized polychlorotrifluoroethylene. A. T. Walter and D. M. Young (to Union Carbide). 2,879,257.

Dimethylhydroxyhexenoic acid, 5-lactone, and polyhydroxy copolymers. J. R. Caldwell and J. C. Martin (to Eastman Kodak). 2,879,260.

Chlorosulfonated hydrocarbon copolymers. P. R. Johnson and M. A. Smook (to Du Pont). 2,879,261.

Ethylene polymerization. A. W. Anderson and M. I. Bro (to Du Pont). 2,879,263.

U.S. Pats., Mar. 31, 1959

Cellular compositions. E. C. Soule and L. S. Burnett (to Olin Mathieson). 2,880,103.

Polypropylene. W. E. Thompson (to Sun Oil). 2,880,121.

Photopolymerization. A. A. Hiltz and E. G. Lendrat (to American Viscose). 2,880,152-3.

Chlorotrifluoroethylene and vinylidene fluoride copolymers. J. W. Borland and E. Schupak (to Allied Chemical). 2,880,154.

Ethylene polymerization. H. Kolling and E. Stiebling (to Ruhrchemie). 2,880,163.

Copolymers of phenoxyethanol ester-formaldehyde condensate. J. E. Hanle and A. M. Tringali (to Interchemical). 2,880,187.

Polyester-diisocyanate condensate. D. H. Coffey, P. C. Johnson, and H. G. White. (to Imperial Chemical). 2,880,192.—End



Periodic Chart of the Atoms. Copyright W. M. Welch Mfg. Company, Chicago

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WORLD-WIDE PLASTICS DIGEST

Abstracts from the world's literature relative to plastics. For complete articles, send requests direct to publishers. List of addresses is at end of this section.

General

Some developments in polymers from petroleum. P. V. Smith, Jr. Ind. Eng. Chem. 51, 248 (Mar. 1959). A major fraction of the ever-growing volume of petrochemicals finds its way into polymeric materials. Five polymeric products, now in the market development stage, are discussed: one elastomer and four oily polymers. A chlorine-containing copolymer of isobutylene and isoprene overcomes many difficulties encountered with butyl rubber. Four polymeric materials based largely on butadiene appear to have outstanding promise in a variety of applications.

Epoxy resins: Outlook is better. Chem. Eng. News 37, 30-31 (Mar. 9, 1959). Production and market statistics for epoxy resins are discussed.

Polyurethane makers aim high. Chem. Week 84, 21-22 (Apr. 4, 1959). Recent developments in and consumption statistics for polyurethane foams are discussed.

Room for plastics growth. Chem. Week 84, 91 (Apr. 11, 1959). New and improved materials for buildings are discussed briefly.

Materials

Selecting plastic laminates for punching. E. C. Graesser. Product Eng. 30, 57-59 (Feb. 2, 1959). High-speed punching or die-cutting techniques can influence the design of the shape of a part and the choice of laminates for that part. To help find the best compromises among punching rate, price, and properties, a comparison guide to materials is given. This consists of a comparison of 32 laminated plastics including phenolics, epoxies, melamines, polyesters, and silicones with several reinforcing agents. Mechanical and electrical properties are considered along with electrical, mechanical, heat-resistant, and general-purpose applications.

Properties of polyurethanes and their applications. J. M. Buist and A. Lowe. Plastics Inst. Trans. 27, 13-27 (Feb. 1959). Polyurethane materials can be produced and used in a wide variety of forms. These include surface coatings, potting compounds, cellular products with a

wide range of flexibility, and solid rubbers. The range and types of flexible polyurethane foams that are now being produced commercially are described. The properties of these foams and their methods of evaluation are discussed in relation to both existing and potential applications in the transport, clothing, packaging, and other industries. Polyurethane materials are also being used as solid rubbers and here the applications range from very soft printers' rollers to tough abrasion-resistant rubber components.

Influence of different factors on the hardening of unsaturated polyesters at elevated temperatures. L. Turunen and B. Berndtsson. Kunststoffe 49, 9-14 (Jan. 1959). The properties of reinforced polyester moldings are determined not only by the nature of the resin and that of the reinforcement, but also by the curing method. Curing experiments at elevated temperatures show that the optimum curing conditions depend upon the nature of the polyester resin. Experiments are described in which certain conditions such as temperature and time were varied, using polyester resins of different compositions. The flexural strength and elastic modulus were determined in the dry state as well as after immersion in boiling water. The significance of the glass/resin bond is also discussed.

Makrolon, a thermoplastic polycarbonate material. W. Hechelhammer and G. Peilstocker. Kunststoffe 49 3-8 (Jan.); 93-8 (Feb. 1959). Makrolon is a high melting point thermoplastic bis-phenol polyester of carbonic acid. The properties and applications of this material are discussed. It has improved mechanical and thermal properties and can be processed by conventional methods.

Molding and fabricating

Better linear polyethylene moldings. R. B. Davidson. Prod. Eng. 30, 55-57 (Mar. 16, 1959). The shrinking characteristic of linear polyethylene (PE) in the mold is often overlooked in design. The selection of a linear PE is usually a three-way compromise involving the structural properties desired, the molding characteristics needed, and economics of the design. Uniform thickness is important be-

cause these materials shrink more in the direction of flow than at right angles to it. Edge reinforcement is particularly necessary at edges of deep-drawn shapes. Ribs or rolled edges are preferred methods of wall stiffening. Generous radii should be provided, as sharp corners tend to set up molding strains in linear PE and these often lead to stress cracking. Threads, external or internal, can be molded with all formulations, but should be restricted to the low-melt index materials because they will resist stress-cracking better when the thread is loaded in use.

Rotational casting of PVC pastes. A. E. Meazey. Brit. Plastics 32, 55-59 (Feb. 1959). The basic principles and features of rotational casting, and the types of available equipment and molds are presented. The quality and composition of polyvinyl chloride paste formulations and their adaptability to rotational casting are discussed. The selection of polymer, plasticizer, stabilizer, filler, and various miscellaneous ingredients for use in the plastisol paste are described in detail, with special emphasis on the types and properties of the plasticizers.

Applications

New rival for carboys. Chem. Week 84, 46, 48, 50 (Apr. 18, 1959). Disposable containers for 15-gal. quantities of liquid chemical consist of a wire-bound box with a polyethylene pouch.

Synthetics: Creating a new look in leather. Chem. Week 84, 55-6, 58 (Apr. 8, 1959). Improved leather finishes are based on urethane, acrylic, and butadiene-acrylonitrile plastics.

PVF film scales up. Chem. Eng. News 37, 44 (Mar. 30, 1959). A new plastic film made of polyvinyl fluoride has outstanding weathering resistance, excellent chemical resistance, and toughness.

Resins spin quality into hi-fi sound. Chem. Eng. 66, 80, 82 (Mar. 9, 1959). Record manufacturers will use about 40 million lb. of vinyl resin and 5 million lb. of styrene resins in 1959 to produce about 250 million high-fidelity records. Record compounds must have low viscosity at molding temperature to minimize (To page 58)

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PLASTICS DIGEST

(From page 56)

cycle time yet reproduce accurately to 350 grooves per inch. They must withstand 100 playings without damage from needle pressures of 26 tons/sq. inch. Stereophonic groove structure and needle size raise contact pressure to about 52 tons/sq. inch. For highest quality reproduction of sound, record material contains about 87% basic copolymer (86% PVC and 14% PVAc), 10% straight PVC diluent, about 1% finely ground colorant such as carbon black, and about 1½% stabilizer such as lead stearate.

Guide to adhesives selection. B. Gould. *Adhesives Age* 2, 19-23 (Mar. 1959). Factors to be considered in selecting an adhesive for a specific job are discussed.

Making trailer bathtubs of reinforced polyester with urethane foam bases. D. M. Ware. *Plastics Tech.* 5, 40-42 (Feb. 1959). Bathtubs are made of glass-fiber-reinforced polyester plastics with urethane foam bases.

New applications of "Trovidur" rigid PVC. R. Walter and W. Pungs. *Kunststoffe* 49, 35-44 (Jan. 1959). New applications for which Trovidur rigid PVC may be used by the chemical and allied industries are described. The examples quoted are those seen at the recent Achema XII (1958) exhibition.

Plastics in the home. *Plastiques-Batiment* No. 29, 5, 7-10, 12-13, 15 (Dec. 1958). The use of plastics materials in building is described. Reinforced plastics, foams, extrusions, pipe, moldings, and adhesives are considered.

Properties

Electrostatic charge and the problem of measuring it. O. Umminger. *Kautschuk u. Gummi* 11, WT297-WT302 (1958). The principles of electrostatic charges and methods of measuring them are reviewed. Several types of equipment and methods are described for charging specimens and for measuring relative charges and discharge rates. The relative charging of PVC films is plotted as a function of dielectric constant, resistivity, and loss factor.

Mechanical and electrical properties of polymers: An elementary molecular approach. J. D. Hoffman. *IRE Trans. on Component Parts CP-4*,

42-69 (June 1957). Interrelations between the molecular structure of the polymers and their mechanical and electrical properties are explained on a molecular basis using the basic parameters of physical state and group dipoles. The emphasis is on linear polymers but the general principles can be extrapolated to more complicated systems.

Polymethylene and the structure of polyethylene. A. H. Willbourn. *J. Polymer Sci.* 34, 569-97 (Jan. 1959). Model compounds in the form of polymethylenes, linear and branched, were prepared and used to develop methods of measuring the numbers and lengths of branches in polyethylene. The polymethylenes used for calibration work contain deuterated butyl branches; the numbers of branches present in the polymers are established by two independent methods: direct assay for deuterium and mass spectrometric analysis of the irradiation products. Using this series a new infra-red technique is calibrated absolutely to measure total numbers of methyl groups and also butyl branches specifically.

Flow of polytetrafluoroethylene. J. C. Millard. *Ind. Plastiques Mod.* (Paris) 10, No. 7, 31-32, 35 (1958). A study of the flow properties of PTFE indicates that the superposition principle of Boltzmann does not apply. Curves are given relating stress and elongation for various times at various temperatures and relating elongation to temperature for various stresses.

Chromatographic fractionation of stereoblock polymers. G. Natta, M. Pegoraro, and M. Peraldo. *Ricerca Sci.* 28, 1473-79 (1958). Fractionation of slightly crystalline stereoblock polymers is achieved by absorption on a highly crystalline polymer of the same monomer. The adsorbent is used singly or on an amorphous support. This technique separates on a basis of crystallinity only. A combination of it and selected solvents is suggested to achieve separation both by crystallinity and molecular weight.

Testing

Vapor-phase chromatography applied to polymer analysis. G. De Angelis, P. Ippoliti, and H. Spina. *Ricerca Sci.* 28, 1444-50 (1958). Polymers may be identified by vapor

phase chromatography of evolved gases produced by pyrolysis of the polymers at atmospheric pressure in an oxygen-free atmosphere at temperatures up to 550° C. Typical gas compositions result for the polymers.

Coatings. M. H. Swann, M. L. Adams, and G. G. Esposito. *Anal. Chem.* 31, 674-78 (Apr. 1959). Recent developments in analytical techniques for coatings are reviewed. 90 references.

Chemistry

Initiation of the polymerization of methyl methacrylate in aqueous solution by hydrazine hydrate. C. C. Menon and S. L. Kapur. *Current Sci.* 27, 245-46 (July 1958). The initiation of polymerization of methyl methacrylate at room temperature and at 0° C. by aqueous hydrazine hydrate is characterized by an induction period, the length of which depends on the concentration of monomer and hydrazine, the pH of the medium, and the type of distilled water used. Hydroquinone increases the induction period but decreases the yield of polymer.

On certain trends in the synthesis and practical application of graft copolymers. A. A. Berlin. *J. Polymer Sci.* 34, 371-79 (Jan. 1959). Methods of synthesis of graft copolymers are discussed.

Publishers' addresses

Adhesives Age: Palmerton Publishing Co., Inc., 101 W. 31st St., New York 1, N. Y.

Analytical Chemistry: American Chemical Society, 1155 Sixteenth St., N. W., Washington 6, D. C.

British Plastics: Iliffe & Sons, Ltd., Dorset House, Stamford St., London SE 1, England.

Chemical Engineering: McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.

Chemical and Engineering News: American Chemical Society, 1155 Sixteenth St., N. W., Washington, D. C.

Chemical Week: McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, N. Y.

Current Science: Current Science Assn., Raman Research Institute, Bangalore 6, India.

Industrial and Engineering Chemistry: American Chemical Society, 1155 Sixteenth St., N. W., Washington 6, D. C.

Industrie des Plastiques Modernes: Rue de Colliase, Paris 8, France.

IRE Trans. on Component Parts: Institute of Radio Engineers, Inc., 1 E. 79th St., New York 21, N. Y.

Journal of Polymer Science: Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y.

Kautschuk und Gummi: Verlag für Radio-Foto-Kintoechnik, G.m.b.H., Berlin-Borsigwalde, Germany.

Kunststoffe: Karl Hanser Verlag, Leonard-Eck Strasse 7, Munich 27, Germany.

Plastics Institute Transactions and Journal: The Plastics Institute, 6 Mandeville Pl., London W1, England.

Plastics Technology: Bill Brothers Publishing Corp., 630 Third Ave., New York 17, N. Y.

Plastiques-Batiment: 94 Rue Saint-Lavare, Paris 9, France.

Product Engineering: McGraw-Hill Publishing Co., 330 W. 42nd St., New York 36, N. Y.

Ricerca Scientifica: Consiglio Nazionale delle Ricerche, Piazzale del Scienze n. 7, Rome, Italy.—End



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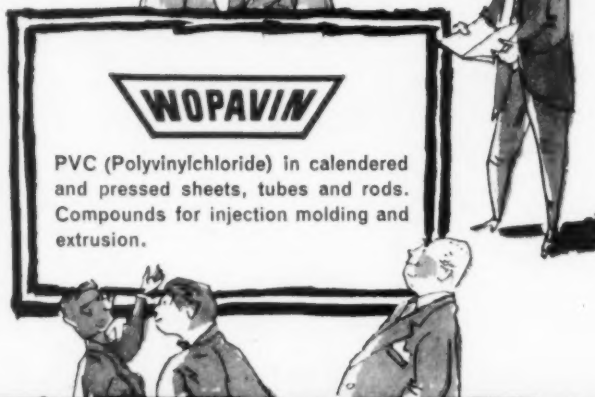
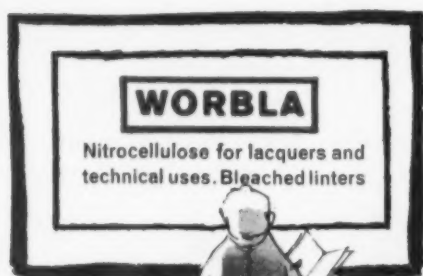
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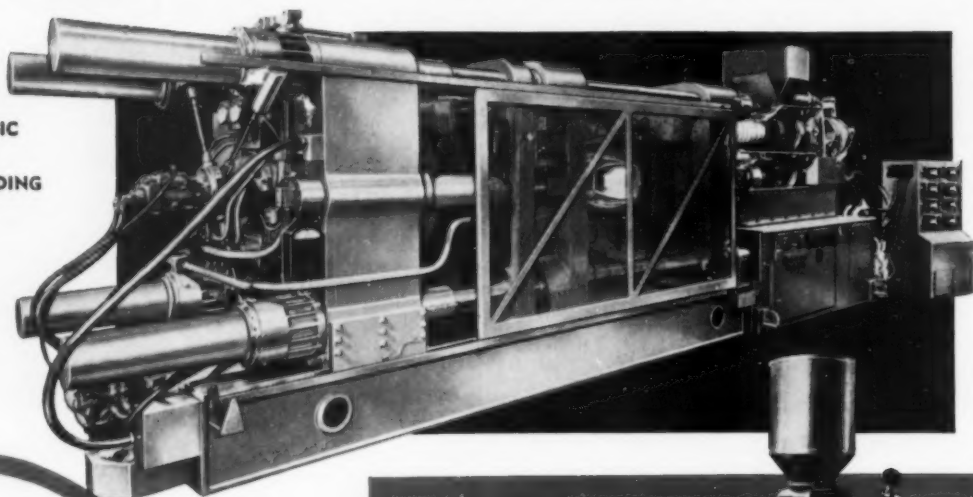
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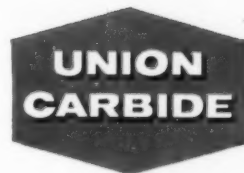
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Elongation, %	210
Yield Strength, psi	1500
Brittle Temperature, °C	
50% OK	-70
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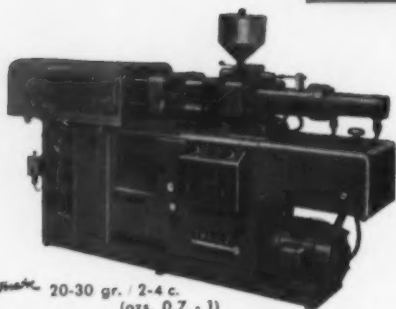


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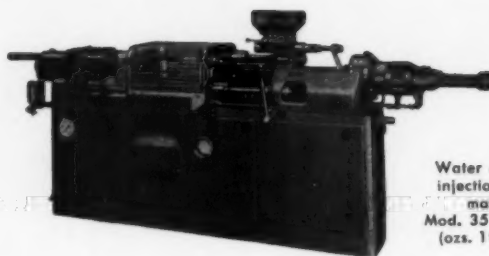
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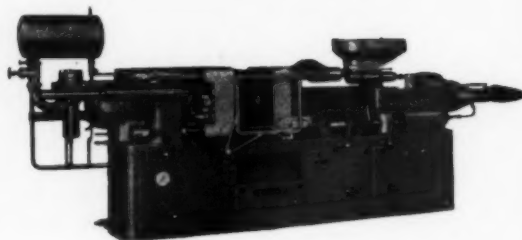
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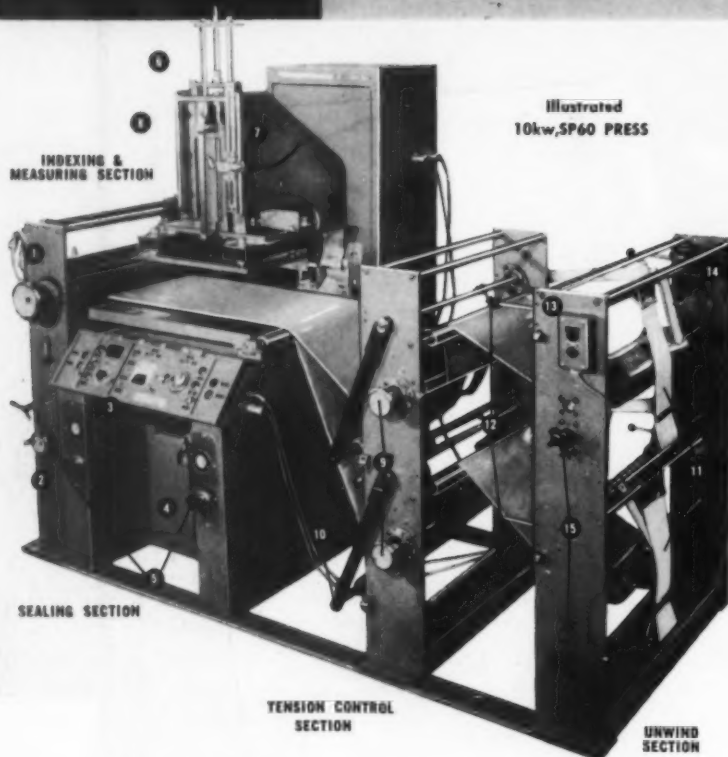
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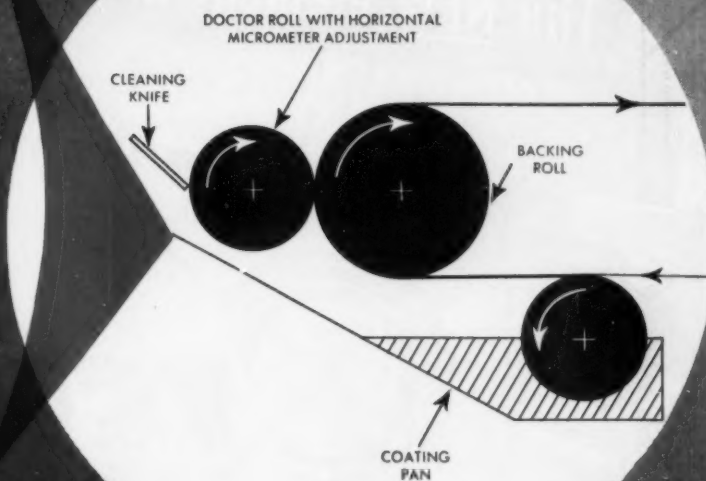
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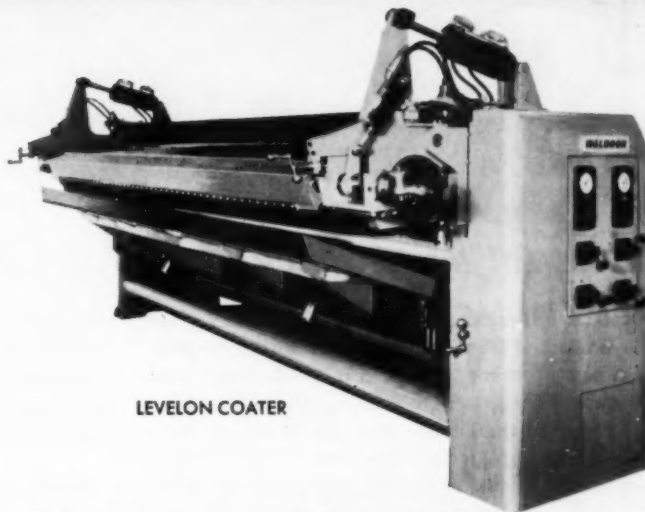
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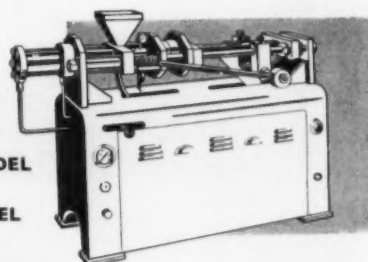
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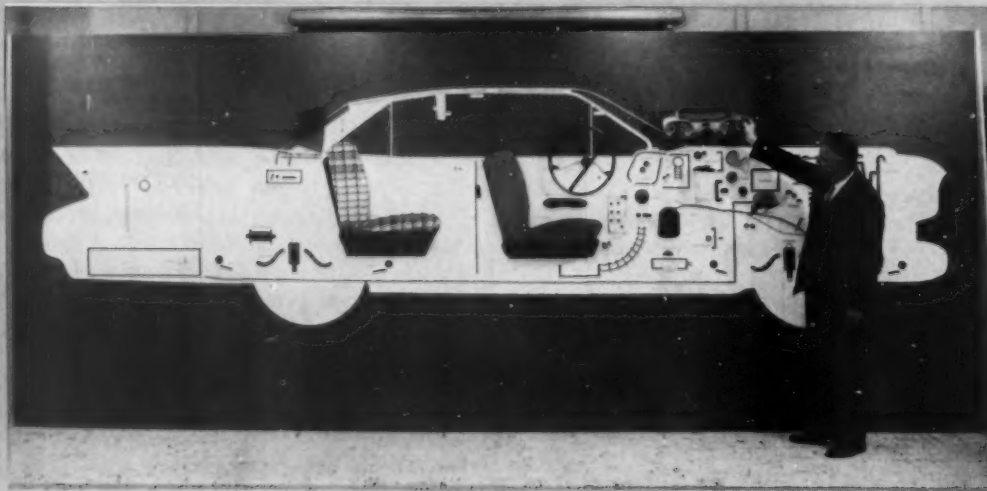
Plastics Hi-lites

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At its present cost, Pro-fax® is today's biggest bargain in thermoplastics.

Like all new plastics, Pro-fax, Hercules polypropylene, found its early uses in jobs where its unique combination of properties served a special need. Thus uses requiring the outstanding heat resistance of Pro-fax, or its excellent mechanical and chemical properties were among the first to be developed. But by now the word has gotten around: the properties of Pro-fax are only part of the story. Its present price, coupled with a low specific gravity that spells many additional pieces per pound of material, *makes Pro-fax today's biggest bargain in thermoplastics!* Plastics producers in a broad list of markets are finding they can save real money in both resin and processing costs—and at the same time obtain a superior product—by converting to Pro-fax.

Quick to get on the Pro-fax bandwagon have been the large volume producers who supply the auto industry and the appliance markets. Here, where even small savings can add up to big money, Pro-fax has proved itself a truly structural plastic, able to perform well, and at low cost, in a variety of functional uses. On the other hand, the design possibilities of Pro-fax loom large in the thinking of manufacturers of housewares, toys and packaging. Here Pro-fax is now being used in growing volume in products formerly made of wood, metal or glass, to yield better-looking, fast-selling, quality merchandise. And again, the price is right . . . to producer and consumer alike. Take, for example, all the handsome new Pro-fax products shown here.



Right for automotive uses!

Auto builders are switching to Pro-fax for many key uses. This full scale diagram of a modern car shows the location of more than 100 parts made of Hi-fax®, high-density polyethylene, Pro-fax or Penton® chlorinated polyether.

Parts now in commercial use or evaluation are mounted in their approximate location on the chart. Projected parts are shown schematically. Call or write for complete information on the use of Hercules plastics in this growing market.

Right at home outdoors! Pro-fax is perfect for housewares, particularly picnic and casual furnishings designed for outdoor use. These handsomely styled dishes, called *Tranquilware* are available in four attractive colors, with a lustrous, durable finish that is completely stainproof, virtually unbreakable, and immune to the detergents and heats of modern home dishwashers. Pro-fax monofilaments used on the outdoor furniture shown in the background are fadeproof and sag-resistant, lightweight, durable, and can't be stained by food or cosmetics.



Tranquil Dinnerware manufactured and sold by Byrd Plastics, Erie, Pennsylvania.



The "Right Touch" in packaging!

Pro-fax packages glamour to perfection in this striking new aerosol container for Coty Spray Cologne. Called *Petite Mist*, it's available in four enchanting fragrances in a choice of two eye-catching color combinations—either jet black or snow white, each richly decorated with gold. Only pennies' worth of Pro-fax, economically formed into this shapely yet functional package, add up dollars' worth of consumer value and merchandising appeal.

Two-piece aerosol package molded by Pyro Plastics, Union, New Jersey.

Right . . . light . . . and bright!



Providing outstanding performance and economy in lightweight plastic bottles, Hi-fax is now the standard by which all materials for blown containers are measured. Note the sharp detail of the lettering on this new Hi-fax bottle for Avon Deep Clean Cleansing Cream. It's typical of the dramatic decorative effects possible with this versatile packaging plastic.

Bottles are molded with Hi-fax by Imco Container Corporation, Kansas City, Missouri.

The right fittings for plastic pipe!



Pro-fax solved this tough engineering problem: the development of long-lasting, low-cost fittings for flexible plastic pipe. "Poly-Plus Blue Fittings" now being marketed in a full range of types and sizes by Union Malleable Manufacturing Company in Ashland, Ohio, are as durable as steel or iron, more corrosion-resistant than brass or copper. Lightweight, easy to assemble, and unmatched for serviceability, they extend the usefulness of plastic piping systems, especially when used in combination with new, low-cost Hi-fax pipe.



Puts Silverware in the right place!

This rigid plastic silverware basket for Westinghouse is an attractive new feature in Westinghouse "Roll About" Portable and "Roll Out" Built-in Dishwashers. It's typical of the cost savings combined with product improvement made possible by the use of Pro-fax in modern appliance design. A handsome, sturdy, one-piece unit, highly resistant to heat, staining and corrosion—it can't chip, crack, peel or rust, and is unbreakable. These new baskets, molded by Cleveland Plastics, Cleveland, Ohio, replace parts previously fabricated with metal wire and a plastisol covering, provide greatly increased resistance to wear, with a richly colorful finish impervious to dishwashing chemicals and household greases.



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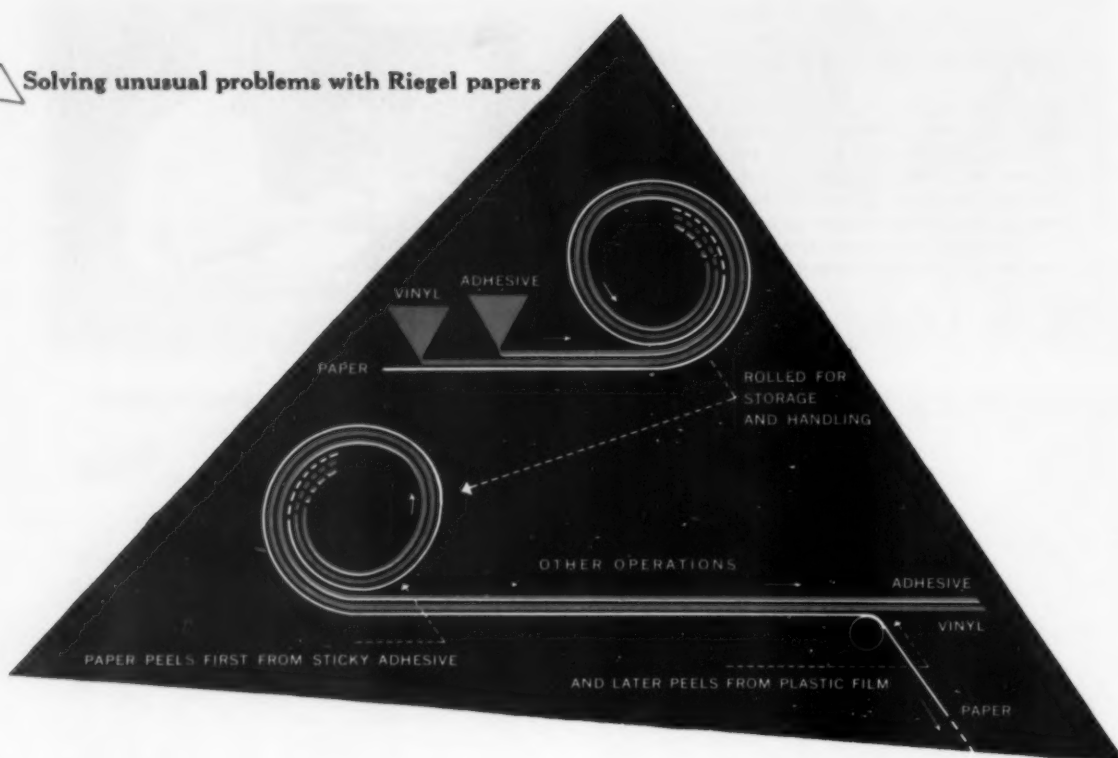
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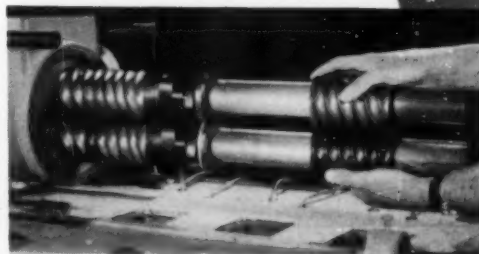
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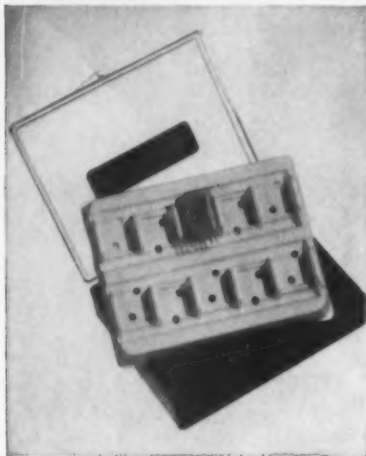
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Campco Styrene Package gives lock-in protection

Guardian Electric Company was looking for an attractive "shock resistant" package for a new line of miniature relays. Special protection was important because of tiny contact pins and varied shapes. A different package for each type would be costly and cause delay on the packing line.



Plastofilm Inc., of Wheaton, Illinois had the answer with a special formed insert of high impact Campco Styrene sheet. Although the relays have as many as ten different types of connectors, they fit snugly in identical compartments of the insert . . . with lock-in protection from shock.

How is this possible—well the compartments grip the relays by a combination of side walls, channels, grooves and holes. Each is capable of gripping any one of the relays in some way . . . providing ease of handling and filling in assembly and packaging.

Another feature is a see-through lid that allows instant recognition of printed codes on the relays. Packaging in plastic can pay off for you, too. Perhaps Campco Styrene is *your* answer.

One Reliable Source

Now you can fill all your requirements for packaging plastics from one reliable source. Campco now offers Polyethylene, Acetate, Butyrate, Styrenes, Polypropylene, Nylon—in sheets or rolls depending on gauge . . . cut to size if desired . . . clear or colored transparent . . . translucent or opaque. Rolls of clear film in stock for immediate shipment at cost savings.

Double-bubble blister of Campco Butyrate doubles market for small stapling machine



The Wilson-Jones Company wanted to expand its market for small stapling machines, currently being sold through the stationery store. It reasoned that if housewives were exposed to their product in self-service outlets, they'd find them useful for fastening jobs around the house. A package was needed that would be pilfer-proof, capable of delivering its own sales message, and interesting enough to create impulse buying.

Campco Acetate Sells while it protects

More and more products are appearing in sales-stimulating packages of crystal-clear see-through Campco Acetate. A special non-blushing formulation in the material enables it to maintain clarity during forming—prevents clouding and discoloration. Campco Acetate protects products, too. In addition to increased sales, manufacturers report fewer rejects due to shipping and handling damage. Campco Acetate is easy to form, unusually low in cost.



Packages by Plastofilm Inc., Wheaton, Ill.

Plastofilm Inc. of Wheaton, Illinois delivered the answer with a combination cardboard sheet and plastic blister of Campco Butyrate. The one-piece blister has two bubbles—one for holding the stapler and the other for 1000 staples. The 6x8 inch card is too large for the pocket and the blister designed so that it cannot be pulled away without destroying the card . . . making pilferage difficult. Impulse buyers are enticed by the see-through blister and sold by the printed message of the housewife doing basic fastening jobs.

Without increasing packaging costs, this new design in a very short time more than doubled sales.

Campco Butyrate is extremely strong and pliable. It can be deep formed, patterned and hole punched without shattering or cracking and is easy to decorate. Available in crystal clear or a variety of colors—rolls and sheets in thicknesses .005" to .125" stock or custom size.

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July 1959, Volume 36, Number 11



MODERN PLASTICS

EVERYBODY NEEDS EPOXIES

From the garage mechanic to the missile man, and now the do-it-yourselfer . . . the epoxies are becoming one of the better-known plastics groups, because people are learning how to use them, and everybody needs them. The boat builder, the construction engineer, the computer designer, the appliance manufacturer, the electronics specialist, the road contractor, maintenance personnel, the defense establishment—they all can use epoxies.

In 10 years epoxies grew in sales from a minor and costly specialty resin competing in the coatings field to a sizable-volume plastic (30 million lb. in 1958) challenging a variety of materials for a broad range of markets.

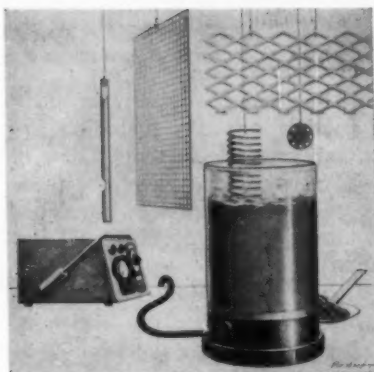
What are the epoxies? What can they do? How do they fit into the economics of industrial production today? These are the questions this series of articles aims to answer.

Experts in each of the many fields where epoxies are now playing an important part will discuss the present status of these resins and how they are used to make better products. Individually, each article will outline the progress that has been made in a specialized market area. Collectively, the articles will constitute a working guide to the diversified epoxy field.

This month's features will acquaint the reader with the four main types of epoxy coatings. In subsequent issues, we will report on epoxy-based adhesives, tooling compounds, electrical and electronic uses, road-surfacing materials, applications in the building industries, and other

markets which are expected to contribute to the growth of epoxies from its present volume to more than 100 million lb. within the next 10 years.

Space does not permit the listing of actual formulations. Readers who are interested in recipes for specific applications should contact the authors of the various articles for details relating to individual problems.



THE COVER. Shell Chemical's artist, Ralph Brillhart, has symbolized the fluidized-bed process of coating metals with solventless epoxies. This process, owned by Polymer Processes, Inc., is described on p. 85.

Esters—variations unlimited P. 82

Solvent solution coatings—the workhorse P. 80

Emulsions—why and how P. 83

Solventless—a dream come true P. 85

Solvent solution coatings — versatile workhorse

By F. J. Buege* and A. C. Drubel†

Versatility is probably the one most important reason for the growth of solvent-based epoxy coatings. This versatility is the result of the considerable range of ingredients that go into formulating an epoxy-solution system: curing agents, solvents, pigments, and fillers.

Low temperature cured coatings

These solvent-borne coatings may be cured at room or low temperatures. Epoxy resins with epoxide equivalent weights in the range of 475 to 575 are utilized. The figures represent the molecular weight of resin per epoxide group.

Curing agents

Many types of curing agents have been discovered and developed in the past decade, but the most commonly used in solvent-borne epoxy resin coatings are amine or polyamide types.

Amine type: These are low boiling, highly reactive, relatively toxic liquids, varying in molecular weight, volatility, and water sensitivity. When epoxy resin coatings are cured with amines, they develop maximum chemical, corrosion, and abrasion resistance. Because of the toxicity and sensitization problems that

may occur with improper use of amines, they often are employed as adducts. These are simple solutions of amine to which sufficient liquid epoxy resin has been added to reduce volatility, and, therefore, to provide a more stable and less hazardous modifier. The use of adducts also relieves blushing problems in some applications and contributes to simpler and more convenient formulating practice.

Polyamide type: These are available in many viscosity grades, and are used where good flexibility and water resistance are required, but where extreme chemical and abrasion resistance properties are not. They have very low toxicity. The reactions between curing agents and resin are exothermic.

Solvents, pigments, fillers

Epoxy resins have good solubility in many conventional coating solvents, including ketones, glycols, and aromatic solvents. Some of the most useful solvents are blends of these materials. By such blending, flow properties are adjusted, film gloss is enhanced, and solvent evaporation rate is controlled.

Epoxy resins wet out common paint pigments satisfactorily. However, the choice of pigment has direct relation to the amount of surface chalking of the final coating. Obviously, this is a function not only of pigment type but also of pigment volume concentration.

Amine or polyamide cured, solvent-borne epoxy resin coatings are two-package systems; the curing agent is added to the formulation just prior to use. Usable life of the mix ranges from a few hours to a day or two, depending on the hardener reactivity and solution viscosity.

At room temperatures, they develop chemical resistance properties such as those of baked urea- or melamine-formaldehyde-modified alkyds in less than 4 to 7 days, although complete cure takes longer. When baked at relatively low temperatures of 200 to 250° F., these same epoxy systems develop ultimate properties of adhesion, abrasion resistance, and chemical resistance within a few minutes.

Such coatings have excellent adhesion to metal, masonry, stone, wood, glass . . . and to nearly every conceivable substrate. They may

*Coatings Technical Service and †Product Mgr., Coatings Sales, The Dow Chemical Co.

BADLY ERODED and discolored pedestrian underpass was saved by epoxy coating. A 2-component system, formulated by Production Paints & Coatings, Inc., provides tile-like layer with maximum brightness and reflection at a cost considerably below that of ceramic tile.



Table 1: Comparison of solvent-borne epoxy coating systems

Hardener	Amine	Polyamide	Urea—and melamine formaldehyde	Phenolic
Cure	Room temp. or low bake (200-250° F.)	Room temp. or low bake (200-250° F.)	Med. bake (300-350° F.)	High bake (350-450° F.)
Film color	2	3	2	5
Flexibility	2	1	2	1
Hardness	2	3	1	1
Abrasion	2	2	1	1
Water resistance	2	1	1	1
Solvent resistance	2	3	1	1
Corrosion resistance	1	2	1	1
Chemical resistance	3	4	2	1

Legend: 1—best; 5—poorest. Based on laboratory and field development work.

be applied at different viscosities by brushing, spraying, dipping, or troweling. End use applications encompass drum, tank, and pipe linings, maintenance coatings requiring extreme chemical and corrosion resistance properties, marine finishes, and both single- and multiple-coated parts finishes. Amine-cured epoxy coatings have excellent exterior durability but do chalk and lose their aesthetic appearance. Polyamide-cured epoxy coatings have particular utility in concrete floor coatings, and in finishes for automotive equipment, metal furniture, and air conditioning equipment.

High temperature baked coatings

Here solid epoxy resins are used. Phenolic and amine-type modifying resins (rather than curing agents) effect the cure, and relatively high temperatures (in excess of 300° F.) are employed. In the cured coating, the best properties of each resin type are exploited.

Formulations are similar to the room temperature systems, and include epoxy resin, modifying resin, solvents, and pigments and fillers. In phenolic-modified systems a small amount of phosphoric acid catalyst is required.

Stronger solvents than those employed in amine or polyamide cured coatings are required. Ketone- and glycol-type solvents are commonly used. If blends with aromatic solvents are employed, stronger blends are needed.

The stability of these baked systems is excellent. They are one-package formulations which ordinarily have indefinite shelf life.

Phenolic cured: Phenol formaldehyde resins are the modifying resins used. Cured coatings

have a typically yellow phenolic cast and are, therefore, unsatisfactory for use in finishes such as white appliance primers. However, this is very nearly their only limitation.

Curing temperatures of 350 to 450° F. produce crosslinked, thermoset epoxy coatings which are unique in their extreme chemical, corrosion, and abrasion resistance properties. Their flexibility is of such a high order that the coatings are useful in can and bottle cap linings, which are unaffected by later forming.

Other important end uses are in linings for chemical storage tanks and for pipes where outstanding corrosion and abrasion resistance are demanded. They also are employed in wire coatings, collapsible tube coatings, and in finishes for electrical parts and for chemical processing equipment.

Amino cured: Urea formaldehyde and melamine formaldehyde resins are the modifying resins used. The advantages of these coatings over phenolic-modified epoxy coatings are the lower temperatures required for cure and their ability to be made in white or pastel colors. Their disadvantage is in lessened chemical and abrasion resistance properties—but these are surpassed only by phenolic cured coatings.

Amino cured epoxy coatings require 300 to 350° F. for cure. They have excellent flexibility, adhesion, hardness, and high corrosion resistance properties.

End uses are in appliance finishes of all types, for can and drum linings, in metal decorating finishes, and for brass and silver coatings, collapsible tube coatings, wire enamels, and coatings for metal furniture. See table, above.



A 10-YEAR LIFE is expected for the top coats at this refinery. Prime coats are expected to last during the life of the equipment. More than 25,000 gal. of amine-cured and epoxy ester coatings were used in this particular installation.

Ester coatings— variations unlimited

By John G. Weinmann*

Epoxy esters have improved performance in many use areas: primer paints, maintenance finishes, floor finishes, appliance enamels, and metal lithography coatings.

Primer paints: The priming of metal presents a number of problems to the coating specialist, the foremost of which are adhesion and corrosion resistance, and specific epoxy esters have been used to advantage in this connection. The successful promotion of the recently developed high melamine content baking type automotive finishes was contingent upon the concurrent formulation of an adequate primer based on a soya type epoxy ester.

Maintenance coatings: These paints can be applied as air drying finishes and possess excellent resistance to the chemicals encountered in cleaning and processing operations.

Floor coatings: Both clear and pigmented types can be prepared from epoxy esters, and these preparations show excellent resistance to abrasion as well as cleaning compounds. Abrasion tests indicate that paints which are based upon a short DCO ester have wear and abrasion resistance vastly superior to that of most conventional air-drying floor coatings.

Appliance enamels: In these formulations, the ester has been used as a replacement for the

conventional short oil alkyd resin in an alkyd-urea formaldehyde or alkyd-melamine-formaldehyde combination. This type of preparation, normally based upon a dehydrated castor oil fatty acid ester, has proven highly useful in the washing machine field because of its resistance to detergents and soaps.

Metal lithography: The excellent adhesion of these resins has, in some instances, eliminated the need for sizing coats; the excellent chemical resistance has resulted in improved processing and sterilization performance; the abrasion resistance has minimized the surface wear of items such as bottle caps in hopping operations; and the excellent flexibility has improved the forming characteristics of the coatings.

In summary, epoxy esters offer the surface coating technician an added tool for formulating finishes, both air-drying and baking types, that are outstanding for chemical resistance, abrasion resistance, flexibility, and adhesion. The number of possible epoxy ester combinations that can be prepared is almost infinite, and the relative ease with which specific esters can be formulated enables the paint chemist to solve a great number of paint problems.

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Emulsions—why and how they are used

By C. K. Thorstad*

The outstanding resistance properties of epoxy resins add a new dimension to emulsion vehicles in the paint field. Here is the story of the contributions these resins make in areas where polyvinyl acetate, acrylic, and butadiene-styrene have proved so successful.

Trade sales (shelf goods)

Since epoxy esters have a more conventional drying mechanism than do the pure epoxies they are generally used in trade sales formulations. Several problems are involved here.

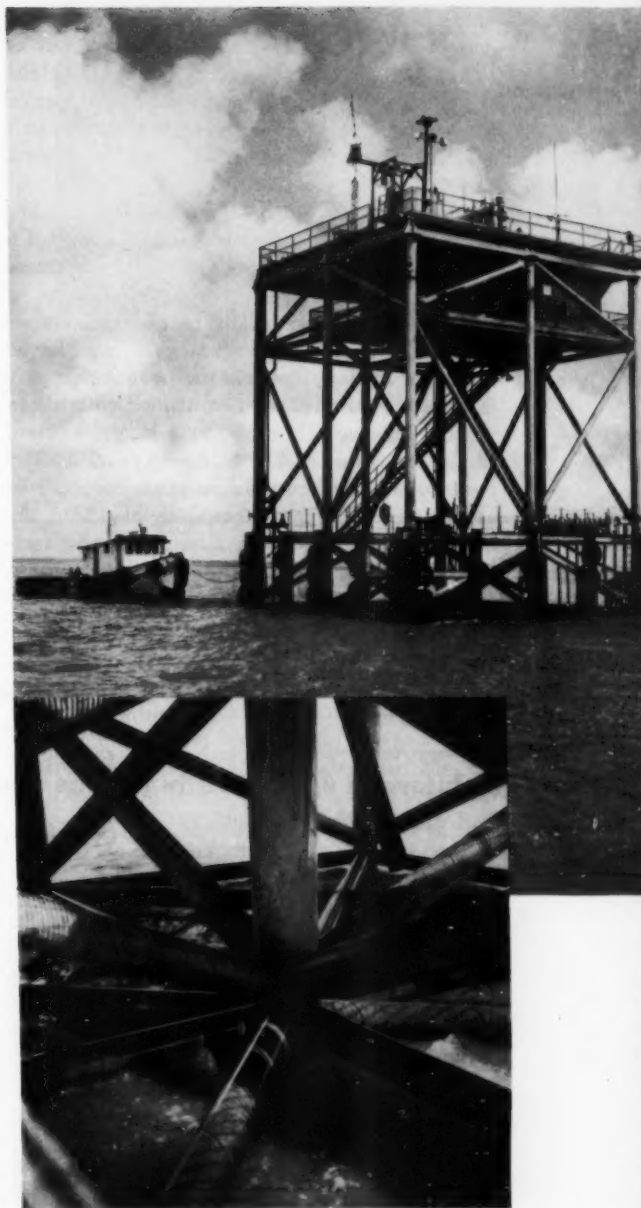
The first is that of efflorescence (paint film becomes powdery), which had been a constant problem with high polymer emulsions. This condition is probably due to the fact that their method of film formation promotes a so-called "breathing type" of paint. The addition of a more fluid type of resin results in a more continuous film. An epoxy ester is thus a logical choice. It air dries satisfactorily to form a continuous film and has good alkali resistance.

Modification of high-polymer formulations with epoxy esters also show good results. For example, it was found that the use of a conventional polyvinyl acetate exterior formulation, with a 15% epoxy ester modification on the PVAc solids, gave a paint that on three years' exposure over unglazed asbestos shingles and transit board in Florida showed none of the mottling or efflorescence exhibited by some 20 other PVAc and acrylic paints.

Thermoplasticity of the dried film is another common denominator of high polymer emulsion resins which have a lacquer type dry. This characteristic, while it is an advantage in some instances, is definitely a liability in floor paints and similar applications. Here, too, the addition of an epoxy ester to a high polymer resin such as acrylic, PVAc, or butadiene-styrene will give an improved product for resisting the softening due to heat. This is attributed to the fact that the epoxy ester is an oxidizing resin and, in this manner, acts to reduce thermoplasticity.

When combinations of an epoxy ester and one of the high polymer resins are used together, drawdowns of the clear films are cloudy, indi-

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CORROSION RESISTANCE for tubular steel construction in the Gulf of Mexico is provided by an amine-cured epoxy coating. The manifold installation of this production platform is 10 ft. above the water line, but will be inundated during major storms, as shown in inset close-up.

cating incompatibility of the two systems. This would naturally lead one to suspect poor film integrity. However, tests indicate that the film properties are upgraded.

Industrial coatings

Another field of interest for epoxy ester emulsions is as the sole vehicle in industrial primers. These may be either air dried or baked. As is typical with emulsion vehicles which cure by oxidation, a longer curing period is required than for the same vehicle cut in a solvent. Therefore, wherever possible, a force dry or bake is preferred.

One of the most successful endeavors in using pure epoxy emulsions has been in baked finishes. Here the field is open to the use of latent converters, thereby lessening the danger of breaking the emulsion. This makes possible one package systems and eliminates the need for an induction period. Perhaps the best system is a pure epoxy that has been emulsified with a converter. This vehicle cures to a hard, resistant film when baked at 400° F. for 15 minutes. The addition of 2% dimethyl acid pyrophosphate or ammonium hydrogen phosphate based on the above vehicle solids will allow for curing temperatures of 325° F. for 15 minutes.

The ideal system would be the use of water

soluble urea formaldehydes or melamines in conjunction with the epoxy emulsion. This would allow the use of a good wetting resin as the grinding media, thereby making it easier to obtain a high gloss. The conversion temperature of this system is 400° F. for 30 minutes. At this temperature some yellowing of the film will occur due to the emulsifying agents used. Better films are obtained if a catalyst such as boron trifluoride (BF_3) is used since lower curing temperatures can be utilized (300° F. for 30 minutes). Ammonium hydrogen phosphate can be used in place of the BF_3 if a one-package system is desired; but baking temperatures must go to 350° F. for 30 minutes.

The ideal procedure for making emulsions is not by emulsifying conventional resins, but by emulsion polymerization. However, it is not practical to make conventional epoxy resins by this procedure.

Every coating formulation is a compromise. To use water, certain sacrifices must be made. The use of epoxies in emulsion form provides a means of upgrading the high polymer emulsion to provide reduced water sensitivity, reduced thermoplasticity, better film continuity to minimize efflorescence, to improve adhesion and pigment wetting, and to supplement resistance to alkali and abrasion.

Reinforced epoxy coating saves municipality lots of money



While epoxies are by no means a low-cost material, their use can nevertheless result in significant savings. Dramatic evidence of this fact came to light recently when the city of Lansing, Mich., through the use of epoxies, was able to save a tidy \$119,500.

The 500-gal. tank pictured at left is used as a reservoir for a water-softening system before it goes through the boilers of city installations. Made in 1923 of $\frac{1}{4}$ -in. steel plate, its thickness was reduced to $\frac{1}{8}$ -in. by 1958 because of corrosion, and many sizable holes had appeared. Instead of replacement, Ren Plastics, Inc., Lansing, recommended reinforced epoxy coating, with an expected life of 20 years and no annual maintenance. Cost of the coating—\$5500; cost of replacement—\$125,000; savings—\$119,500.—End

Solventless coating—a dream come true

By Harry W. Howard*

The long-standing goal of the coatings industry—100% solids—has now been achieved, thanks to epoxies. The idea of being able to supply a gallon of paint without solvent or without water and yet allow its application to a surface to give the normal enamel-like look with the same properties has intrigued many since Noah "pitched" his ark. The dream has now become a reality.

Two areas of 100% solids coatings have been explored by Shell. The first, which uses a special spray gun developed in cooperation with A. Gusmer, Inc., is an adaptation of our amino-cured system with liquid resins. The second is the fluidized-bed technique.

Spray-gun method

The liquid epoxy resin is pigmented by conventional means and packaged in one container. The curing agent or hardener, also pigmented, is packaged separately. For application, the two materials, base resin and curing agent, are poured into separate pressure pots and piped to the special equipment where pumps, heaters, and metering devices deliver resin and hardener to the gun head in separate lines at a predetermined temperature and pressure. The applicator merely pulls the trigger on the gun which activates the whole set-up electrically and a stream of the proportioned mixture is sprayed onto the surface. Films of this type may be applied at 5 to 30 mils thickness in one coat. They harden in ½ hr. and cure in 48 to 72 hours. These films are finding their greatest use where extreme chemical resistance and film build are required, and in tanker linings where volatile solvents have proven undesirable. Other areas of interest are highway maintenance, silo construction, roof toppings, finishing of plastic parts normally affected by solvents, repairing damaged warehouse floors, and in RP molding.

Fluidized bed

A finely divided dry resin paint is air-buoyed to behave in a manner similar to a liquid. The object to be coated is preheated and



LAB TECHNICIAN withdraws metal springs from fluidized epoxy bed. Paint build-up from a single dipping is shown on pieces in the upper left.

then immersed in the fluidized bed, fusing a layer of resin particles uniformly over its surface. Upon withdrawal it is then given a further bake in the usual manner. This curing causes the dry resin paint to melt, flow together into a continuous film, and then harden during the curing process just as a conventional enamel would.

A coating applied in this way assures uniformity of film thickness, eliminates the need for several coats, and allows the coating of extremely complicated shapes with the ease of coating a simple shape. Uses for a coating process of this type would normally be in the field of production line items, washing machine rotors, electrical components, wire enamels, etc. (See cover illustration.)

This technique for applying coatings was originally developed for use with such thermoplastic resins as vinyl, polyethylene, polypropylene, nylon, fluorocarbons, etc. It was invented in Germany, and is licensed by Polymer Processes, Inc. in the United States. Shell Chemical Corp. studied the adaptation of thermosetting materials to this process, and among those tried were the high molecular epoxies modified with phenolic resins, and later on with amines.

These two methods are examples of the importance of new equipment and technique in expanding epoxy resins applications.—End

*Senior Industrial Specialist, Plastics and Resins Div., Shell Chemical Corp.



LOW SLUNG TRAIL-CADDY, attached to a small foreign car, affords substantial additional luggage space. Low profile permits full rear view to driver in car.

'Trunk space' for small cars

Reinforced polyester trailer, weighing about 275 lb.,

carries 1000-lb. loads, costs much less than equivalent metal unit

Owners of sports cars or small foreign vehicles now have a solution to the persistent problem of where to put the luggage: a reinforced polyester trailer.

Produced by Eubanks Industries, Inc., Hialeah, Fla., and distributed nationally by Trail-Caddy Corp., Coral Gables, Fla., the unit carries a manufacturer's price of \$165. According to Eubanks, the comparable price for a metal trailer would be approximately 50% more.

The bed of the trailer measures 5 by 3½ ft. and is about 2 ft. deep. Total weight, including a special axle and wheels, is 275 lb. empty; load carrying capacity is 1000 pounds.

The flat rear end of the trailer allows it to

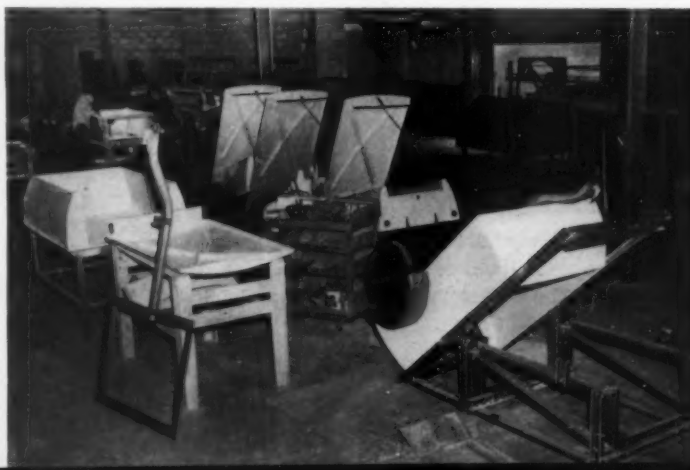
be rested on the tail gate for storage. When used as a hunting trailer, it can be stood on the tail gate and the lid opened to form a rain canopy. The light weight of the unit makes it possible for one person to connect the trailer, disconnect it, store it, and set it up for camping shelter.

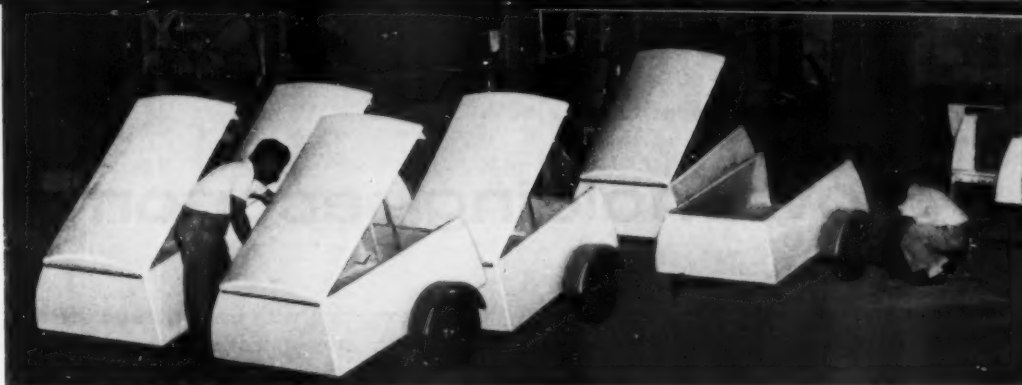
How they are made

The trailer is composed of three parts: body, lid, and gate. All are produced by hand layup. The body is molded in one piece by using split molds, lid and tail are molded separately and attached during final assembly by chrome-plated hinges. The body laminate consists of

ACRYLIC-MODIFIED POLYESTER gel coat is sprayed onto body mold before layup of reinforcement and resin impregnation. Gel-coat is responsible for high gloss of finished unit.

FINAL ASSEMBLY AREA, where towing bar and undercarriage are joined to molded body, using see-saw jig shown. Molding area is in rear. Trimming, drilling, and assembly operations are conducted here.





FINISHED TRAILERS. All trailers are molded with a white acrylic-polyester surface coating, many are later painted to match customer's individual automobile.

Owens-Corning mat sandwiched between two plies of United Merchants woven fabric; the bed consists of $\frac{1}{2}$ -in. plywood core between reinforced plastics skins. Bed and sides are molded in one operation. Nominal wall thickness is $\frac{1}{8}$ in., floor is nominally $\frac{3}{4}$ inch. The lid has a nominal thickness of $\frac{1}{8}$ in. and is reinforced with molded-in stiffeners. The tail gate consists of a sandwich of reinforced plastics skins with a $\frac{1}{2}$ -in. plywood core. Polyester resin is supplied by Celanese Corp.

A special feature of the trailer is its unusually glossy surface, approaching the shine of a car

finish. This is achieved by applying an acrylic-modified polyester formulation as a gel coat. The compound is a Eubanks development and is designated Polacryl #1. In addition to providing a high surface glaze, even when molded against rough surfaces, the coating is also said to provide high impact strength, weather resistance, and heat reflectivity.

Several hundred units have been produced or are on order. With the trend to small cars, this type of car attachment can be expected to grow in use, and reinforced plastics seem to assure its growing popularity.—End

Rectangular milk tank with one-piece molded jacket

Latest innovation by The Heil Co., Milwaukee, Wis., which pioneered reinforced plastics construction in elliptical truck-mounted bulk milk tanks (MPL, November, 1956, p. 103), is the new Low-Lite rectangular milk pick-up tank which consists of a basic inner tank of stainless steel with a one-piece molded jacket of glass-reinforced polyester material. Included in the molding is a layer of balsa wood, which provides added thermal insulation and structural strength.

Lighter weight, a lower center of gravity, and lower over-all height are among the advantages claimed for the new rectangular tanks, which will be made in capacities ranging from 1800 to 3000 gallons. The 1800-gal. Low-Lite tank, for example, is 12 in. lower and has a center of gravity $6\frac{1}{2}$ in. lower than that of an elliptical tank of the same capacity. This means surer, safer roadability, better mileage, and reduced tire wear.

Polyester resins used in producing the Heil tanks with special king-sized molds and techniques developed by the company, are supplied by Plastics Div., Celanese Corp. of America, Newark, N. J. Glass mat is from Owens-Corn-

ing Fiberglas Corp., New York, N. Y. Glass cloth is supplied by Flightex Fabrics, Inc.; United Merchants Industrial Fabrics, Div. Davis Mills Corp.; J. P. Stevens & Co., Inc.; and Hess Goldsmith & Co., Inc., all in New York, N. Y.—End



Blow molding—economics

As more and more blow molding equipment is becoming commercially available, the increasing demand for hollow, lightweight articles in the container, toy, and industrial fields is focusing attention on the relative economics of the various systems used and on the markets available. It is estimated that the consumption of high-density polyethylene in the U. S., for rigid packaging containers alone, could be in the region of 240 million lb. per year, provided markets are approached on a realistic basis and engineering developments keep pace with requirements.

Six methods—pros and cons

The basic principles involved in blow molding thermoplastic materials are very simple: entrap a softened hollow body of material (known as parison) in a simple mold, introduce air at medium pressure to cause inflation of the material, and allow sufficient time for cooling while pressure is maintained.

Present production methods range from simple manual operations to relatively complicated automatic ones, and fall into six groups: 1) injection with transfer—hand and mechanical;

2) extrusion with hand transfer; 3) fixed mold with interrupted extrusion; 4) rising mold with continuous extrusion; 5) alternate-flow, manifold extrusion; and 6) multi-station, rotary extrusion.

Injection with transfer—hand and mechanical. (See Fig. 1.) An injection molding machine is fitted with a special mold with removable core, ending in a hand grip, to allow the formation of a closed-end parison somewhat like a test tube. Alongside the machine, on a separate frame is carried a second mold comprising the blowing cavity and a simple latch-type, manually operated locking device.

In operation, the parison is molded around the core through a hot-runner, pin gate. The mold is opened before the material is set up and the core, carrying the parison, is transferred manually to the blow mold. As this mold is closed, male and female registers accurately locate and lock the core and parison in position. At the same time, an air nozzle enters into a seat in the core and air pressure is introduced to inflate the parison.

More than one article can be produced at a time by using multiple-cavity injection and

TABLE 1: Comparing economics of two blow molding systems in making dolls—3 rising-mold, single-cavity machines vs. 1 rotary 6-cavity unit

Machines to produce dolls requiring three separate molds for body, arms, and legs. Each single-cavity machine is fitted with a separate mold. The rotary machine must be fitted with six molds for each item, and requires 18 molds altogether. The combined

single-cavity machines produce at half the rate of the rotary machine in a given time at equal part weight under optimum conditions; in this case the output is 300 and 600 complete dolls per hour, respectively.

COMMON FACTORS

Equipment—approximately equal	not charged	Cycle time per mold	12 sec.
Material—consumption equal on quantity produced	not charged	Set up cost (install mold and adjust)	\$10 per mold per change
Molds	\$800 each	Consumed utilities	1¢ per lb. material
Supervisory labor	\$3 per hr.	Building, administration } Considered equal	
Average weight of part per mold	2 oz.	Sales, maintenance }	—not charged

TIME AND COST TO PRODUCE

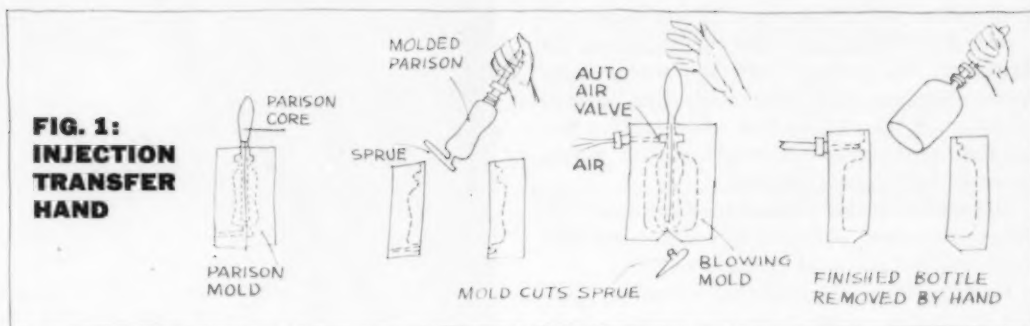
	240,000 Dolls		960,000 Dolls		1,920,000 Dolls		3,840,000 Dolls	
	A ^a	B ^b	A	B	A	B	A	B
Charge	800 hr.	400 hr.	3200 hr.	1600 hr.	6400 hr.	3200 hr.	12,800 hr.	6400 hr.
Molds	2,400	14,400	2,400	14,400	2,400	14,400	2,400	14,400
Set up	30	180	30	180	30	180	30	180
Utilities	900	900	3,600	3,600	7,200	7,200	14,400	14,400
Supervisory labor	2,400	1,200	9,600	4,800	19,200	9,600	38,400	19,200
Cost	5,730	16,680	15,630	22,980	28,830	31,380	55,230	54,580

^aA—Single-cavity mold system. ^bB—Rotary machine.

Note: Reference to Graph 1 produced from these figures shows that under these conditions the three single mold machines provide the best economy up to the break even production of approximately 3.5 million dolls.

and markets

What systems have been developed to date? How do they compare with each other? Detailed production cost analysis gives answer **By Vernon Hill***



blow molds and by joining a matching number of cores on a cross head member. A definite rhythmic cycle can be obtained by using two sets of cores, so that one is in place in the molding machine receiving the parisons, while the other is in place in the blowing mold during inflation and cooling.

Operating on exactly the same principles as the manual transfer, it is possible to have both

*Continental Can Co., Newark, N. J. Work was done while the author was with Celanese Corp. of America, Newark. Adapted from a paper presented at the 15th Annual Technical Conference of S.P.E., New York, Jan., 1959.

injection and blowing cavities mounted within the platen area of the injection molding machine and for the cores to rotate or reciprocate automatically with the opening and closing of the platens, each phase of the operation being controlled by electronic or other timing devices.

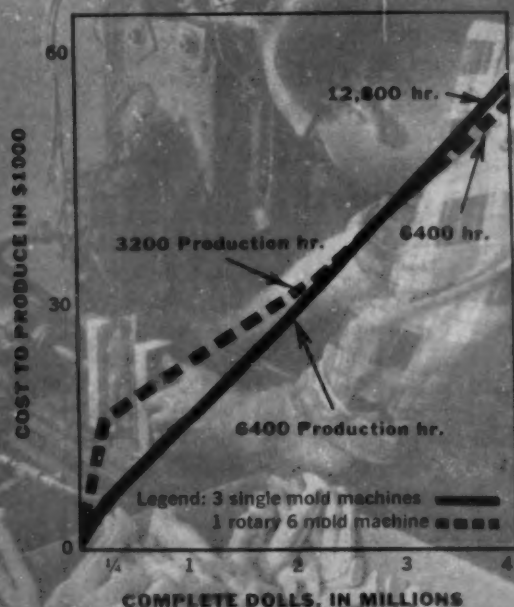
ADVANTAGES. Existing injection molding machines can be utilized; permit molding and cooling of a section of the parison to form, for example, a non-drip threaded bottle neck without the need for any secondary operations for finishing. It also allows variations in wall thickness of the parison body, in any area, to give additional material where required to maintain wall thickness.

DISADVANTAGES. By virtue of the need for injection molds, blowing molds and special cores, tooling costs for any one item will be higher than required to produce a similar size/weight item by extrusion blowing.

Extrusion with hand transfer. (See Fig. 2.) A blowing-cavity mold is mounted in any suitable closing/locking device adjacent to an extruder fitted with a tube die. In operation, an operator cuts off a measured length of hot parison and transfers it to the blowing mold. The parison can lie horizontally or be hung vertically, suspended from some holding device. Air can be introduced through a tube or mandrel or by means of a needle which pierces the parison at the time of the mold closing.

Several molds can be arranged around the head of the extruder, and a cycle set up whereby the operator is filling and emptying the molds in continuous rotation.

For example, if an extruder plasticating 60



lb./hr. is employed, the articles to be produced weigh 4 oz. each, untrimmed, and only seconds are required to load, blow, cool, and empty the mold—then four molds, each equidistant from the operator's position, allows production of four pieces per minute on a 15-sec. cycle.

ADVANTAGES. Low cost of equipment investment; low tooling costs, low set up costs when changing item production, low maintenance costs, the only system which allows manipulation of parison to conform with differences in mold cavity sections.

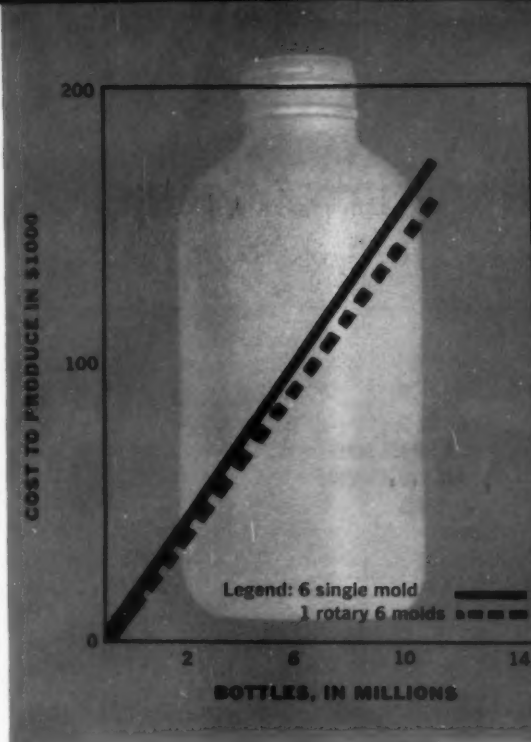
DISADVANTAGES. Operator fallibility, high direct labor cost, difficulty of maintaining wall thickness and material distribution.

Fixed mold with interrupted extrusion. (See Fig. 3.) In this method a blowing cavity is fixed below an extruder in such a manner that a tubular parison will descend between the open mold faces, adjacent to the cavity axis. The molds can be closed and clamped, but it is necessary to provide some means of stopping the extrusion when the parison has reached the required length and the mold is to be closed. No extrusion can take place during the blowing/cooling, mold opening, and part removal cycle.

ADVANTAGES. Allows the production and entrapment in a mold of parisons which, by virtue of their diameter-to-wall thickness, length-and-weight ratio cannot be manually transferred into a mold; minimum initial capital investment; and low tool costs—minimum cost when changing item production.

DISADVANTAGES. Extended cycle time, comprising a total of the time required to extrude the parison, cool the piece, and open and close the mold; high direct labor cost.

Rising mold with continuous extrusion. (See Fig. 4.) This system uses basically the same



approach as the last-described technique but requires less cycle time.

This is accomplished by raising and lowering the mold in such a manner that it closes in the raised position. Then, when the tail of the parison has been separated from the extrusion die, the mold drops down faster than the speed at which the next parison is extruded. Blowing takes place during this descent. A dwell period at the bottom of the descent allows completion of the blowing/cooling, mold opening, and ejection of the piece. The open mold then raises quickly to repeat the cycle, closing as the parison just reaches the correct length. It is necessary to adjust the rate of extrusion to balance

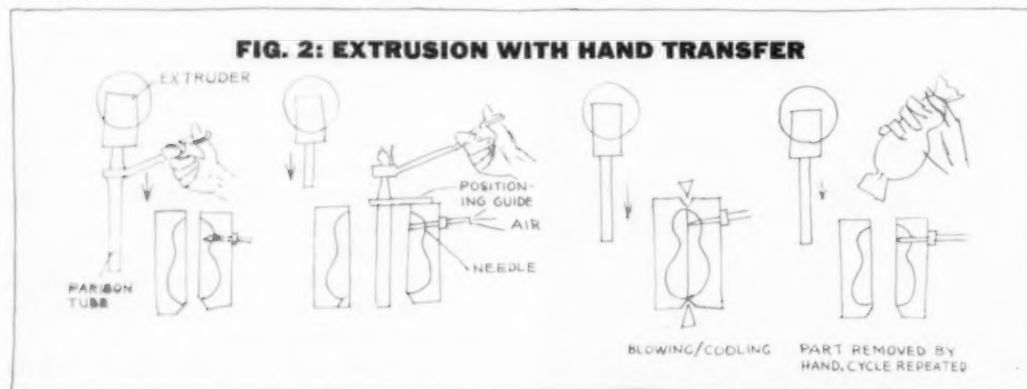


TABLE II: Comparing the economics of two blow molding systems in making bottles—6 rising-mold, single-cavity machines vs. 1 rotary 6-cavity unit

Machines to produce bottles; each single-cavity machine is fitted with a mold to produce the same item. The rotary is fitted with six molds at one set up. The combined single-mold machines produce at

the same rate as the rotary machine (1800 units per hour) in a given time at equal part weight (2 oz.) under optimum conditions.

COMMON FACTORS

Equipment amortization—single mold	\$3.60 per mold per hr.	Weight of part per mold	2 oz.
Equipment amortization—rotary mold	\$1.80 per mold per hr.	Cycle time per mold	12 sec.
Material—consumption equal	not charged	Set up cost	\$10 per mold per change
Molds	\$800 each	Consumed utilities	1¢ per lb. material
Supervisory labor	\$3 per hr.	Building, administration } Sales, maintenance }	Considered equal —not charged

FINANCIAL COMPARISON

To operate for one year, production of both systems is 12,960,000 single unit parts, assuming 100% efficiency, 24 hr. per day, six days per week for 50 weeks per year.

TIME AND COST TO PRODUCE

Charge	Both A ^a and B ^b	In applying the amortization of the equipment to both systems for the one year operation, the total cost for each will be:	A ^a	B ^b
Molds	4,800			
Set up	60			
Utilities	16,200			
Supervisory labor	129,600			
Cost—without amortization	\$150,660			
		Charges	150,660	150,660
		Amortization	26,000	13,000
		Total	\$176,660	\$163,660

^aA—Single-cavity mold system. ^bB—Rotary machine.

Note: In this case the cost of the six single-mold machines is twice that of the single rotary. Amortization has now to be allowed, in each case, over a two-year period.

with the total time required for cooling and mechanical movements.

ADVANTAGES. Moderate initial capital investment, low tool costs, continuous extrusion of parison body, ability in certain instances to arrange fully automatic operation.

DISADVANTAGES. Some problems of adjusting extrusion rate to match total cycle and maintain optimum results.

Alternate flow manifold extrusion. (See Fig. 5.) A suitable extruder is fitted with a pressure balanced manifold carrying several extrusion die heads beneath which are arranged a matching number of molds, each capable of independent opening and closing.

In practice, the extruder runs continuously, but automatically operated devices allow the material to leave the extrusion dies in staggered sequence. This permits the blowing cycle to operate in matching sequence and minimum cycles can be obtained in automatic operation.

ADVANTAGES. The ability to use a reduced number of extrusion outlets to provide greater poundage of material at fewer stations, and allow the production of large items on longer, though still balanced, cycles.

DISADVANTAGES. Problems in obtaining balanced melt viscosity and extrusion rates from each die; initial capital investment and maintenance costs; multiplicity of molds for any item, resulting in high tooling costs.

Multi-station rotary extrusion. (See Fig. 6.)

A rotary unit carries a series of molds at evenly spaced intervals. The mold stations have individual clamping mechanisms capable of sequence operation. All liquids and gases for clamping, cooling, blowing, etc. are conveyed to each station by suitable piping arrangements connected to rotary valves, or couplings, located within the hub or axle.

The complete rotating mechanism is mounted in fixed position adjacent to an extruder in such a manner that rotation is effected in either vertical or horizontal plane in continuous movement or by intermittent indexing. Extrusion

FIG. 3: FIXED MOLD WITH INTERRUPTED EXTRUSION

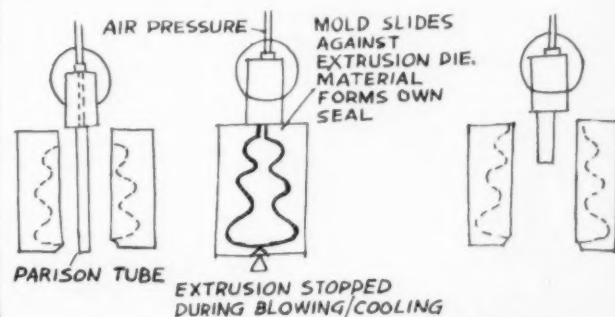


FIG. 4: RISING MOLD—CONTINUOUS EXTRUSION

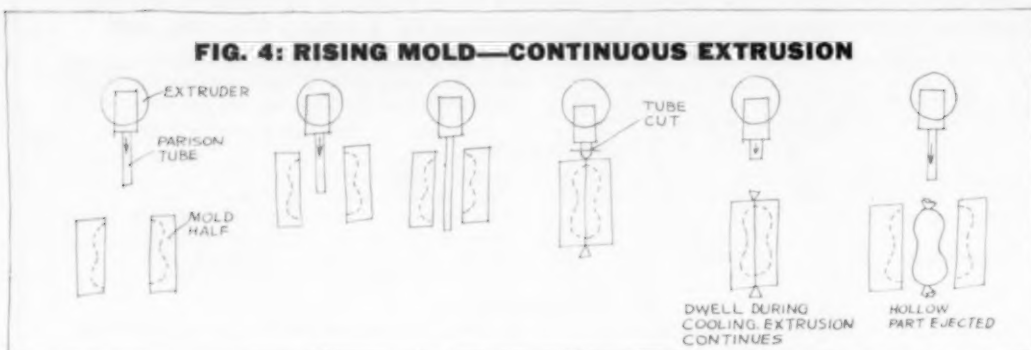


FIG. 5: ALTERNATE FLOW—MANIFOLD EXTRUSION

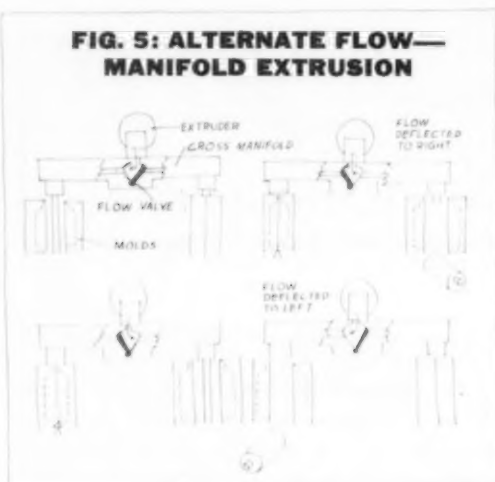
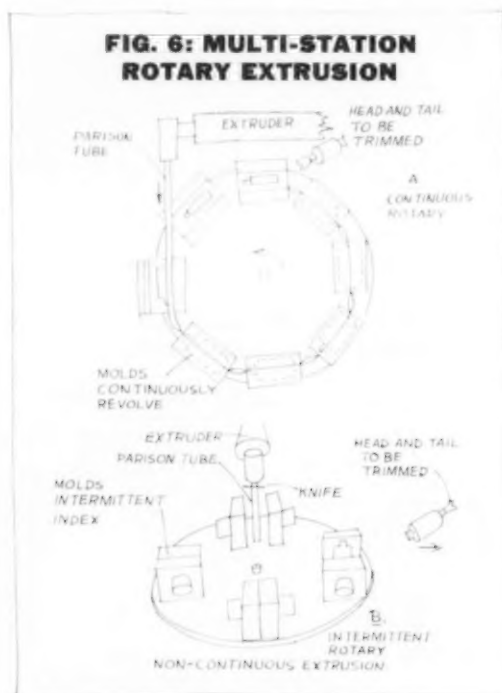


FIG. 6: MULTI-STATION ROTARY EXTRUSION



sion is continuous or intermittent, depending on the method of introducing the blowing air. The tubular material forming the parisons can be severed from the main body at the extrusion die before blowing, or at the mold at a later station.

ADVANTAGES. High rates of production, minimum direct labor costs.

DISADVANTAGES. High initial capital investment; multiplication of maintenance requirements; high tooling costs, caused by multiple mold requirement for any one time; high percentage of excess parison material produced in some systems requiring additional handling and reworking.

The economics of blow molding

Blow molding offers important economic advantages in the production of hollow objects over other systems: 1) It eliminates assembly operations and costly matching cores to produce hollow items; 2) mold costs, cavity for cavity, are approximately one-eighth that for injection molding, except in the injection blowing process in which case costs are approximately one-third; 3) wall thicknesses can be reduced below the possibilities afforded by injection molding; 4) fully automatic operation can be obtained when employing highly developed equipment.

However, the choice of equipment and number of mold stations is dictated by type and volume of market. A multiple-mold-station machine can be less economical than an efficient, automatic, single-mold machine in certain instances. For example, in the production of blown dolls, where bodies, arms, and legs have to be produced from parisons of differing diameter and weight, as well as wall thickness, comparison can be made in the following remarks:

Based on present equipment cost a single-cavity, rising mold machine (To page 151)



How to perforate thin PE film

SMOKE PASSES EASILY through ultra-thin PE film perforated by system illustrated in sketch at lower right. Film did not tear though pulled tight over face.

With all the publicity and excitement over infant deaths caused by superthin polyethylene bags, laboratories of materials makers and converters have instituted crash programs aimed at perforating and/or embossing these thin films with a view to eliminating their danger to infants even when misused. The Medical Div. of Du Pont studied the volumetric breathing habits of infants (under one year), four-year-olds, and adults and calculated that bags perforated with $\frac{1}{32}$ -in. holes and on $\frac{3}{8}$ -in. centers would permit approximately 90% of normal air intake by a four-year-old. Medical literature indicates that 20% of normal breathing is adequate for survival for an extended period.

Experimental films perforated in this manner substantiate that the porosity permits aspiration through single layers of film. When two or more layers are superimposed, however, the perforations are blocked off rendering the film

virtually non-porous again. It was found that this could be overcome by embossing the perforated film. The "seersucker" effect thus created permits flow of air between layers of film, and also appears to lessen the tendency to cling to the skin.

Sketches herewith show cross-section of the embossing and perforating rolls recommended by Du Pont. No costs have been established.

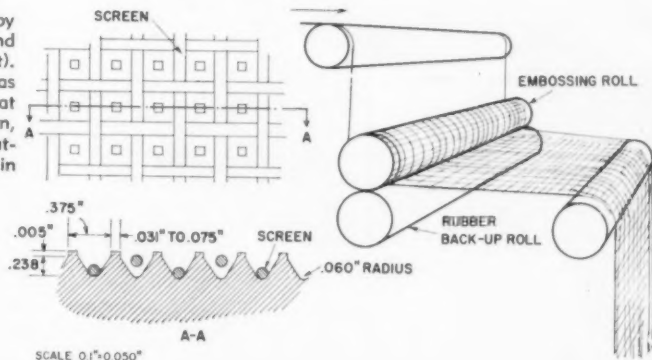
Spencer Chemical Co. has come through with the conception of a plain non-embossed polyethylene film with crescent perforations, making little flaps that would allow air to pass through. It is recommended that the perforating rolls be matching male and female, rather than knives against plain hard rolls, to reduce wear on knives and assure high speeds.

Both methods are offered by the innovators free of charge to any film producer or converter who wishes to use them.—End



METHOD SUGGESTED by Du Pont for embossing and piercing PE film (right). Embossing-cutting roll has square waffle pattern at 45° to machine direction, gives $\frac{3}{8}$ -in. screen pattern with hole centered in screen opening.

SAMPLE OF FILM perforated by Spencer method (left), about one-half actual size.



It adds up to savings

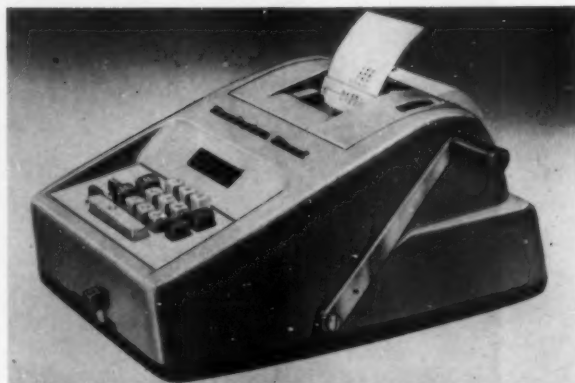
A reduction of 50% in the cost of major housing components, plus additional savings all along the line, were obtained by Remington Rand in redesigning its Models 73 (non-electric) and 93 (electric) adding machines. What's more, the redesign resulted in a more functional product as well.

A great share of the credit for this achievement must go to Auburn Plastics, Inc., Auburn, N. Y., which custom molds most of the plastics components of the machine. The work done by that company in experimenting with various plastics for this application underlines the important role played by custom molders in material selection.

Thermoplastics reduce cost

The cover and front panel, compression molded of phenolic in the old models, are now injection molded of impact polystyrene—which has the strength and low-gloss characteristics required for the parts. By making this switch, a four-step painting operation was omitted, the molding cycle was shortened, and several secondary operations were eliminated.

The same molds are used for both models. A post-molding slotting operation provides an



ALL EXTERIOR PARTS of adding machines (electric model at right, manual above), except base, are molded of thermoplastics. Functionality, economy, and styling determined choice.

inverted V-slot for the handle and a front slot for the correction key on the non-electric model; the electric model has just one rectangular cut in the rear of the cover for an electrical connector plate.

The new cover and lid sell for less than half the price of the one-piece phenolic cover formerly used. The phenolic cover was produced in black and subsequently sprayed and oven-baked to provide a wrinkle finish in gray or tan. The thermoplastic, of course, would not withstand the oven temperatures; but a trend away from wrinkle finished office appliances made possible the consideration of thermoplastics in which the desired color might be incorporated.

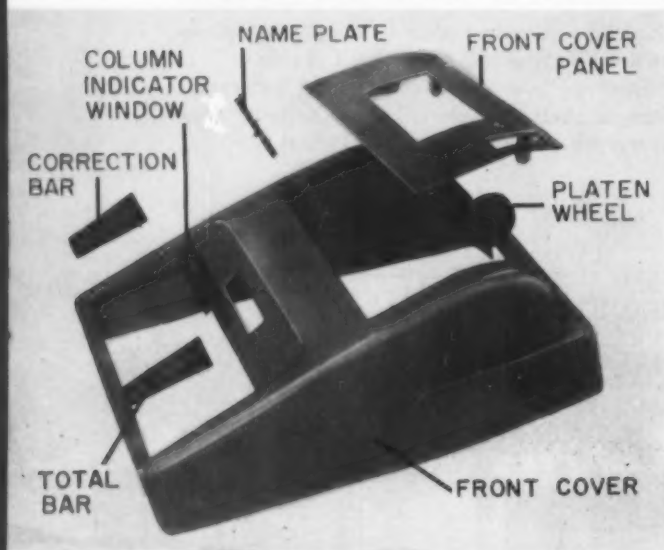
Switch from metal for two parts

The paper tear strip and the name plates, both formerly made of metal, are now molded of plastics.

The paper tear strip is made of clear Plexiglas acrylic and has the advantage over metal in that the operator can look through it. In addition, the tearing action of the molded strip is superior to a metal stamping in sharpness. Cost of the acrylic strip is approximately two-thirds that of the metal strip formerly used.

The name plates are molded of butyrate at a cost of 1¢ apiece. The use of butyrate permits incorporation of an aluminum powder

EXPLODED VIEW, showing major housing components.



Two late model adding machines turn heavily to thermoplastics to reduce over-all cost at no sacrifice in quality.

Molder is important factor in material evaluation.



that fairly well simulates metal; the molded bosses can be swaged by heat, eliminating need for metallic fastening devices. The metallic effect could be achieved in other materials, but the rather delicate proportions of the attachment lugs made butyrate a logical selection as a more brittle material would present shipping problems when the part is sent from molder to adding machine manufacturer.

Implex modified acrylic was selected for the platen wheels because it has excellent non-staining characteristics and is less costly than butyrate, the only other material considered

for the application. The same reasoning led to the choice of the material for the correction and total bars.

The column indicator window is made of Plexiglas. Original specs called for silk screening the gray background. However, the mesh of the silk screen left an uneven window opening, so Auburn hot stamped the characters and at the same time hot stamped a border around the clear "window." An accurate mask made it relatively easy to spray rather than silk-screen the background.

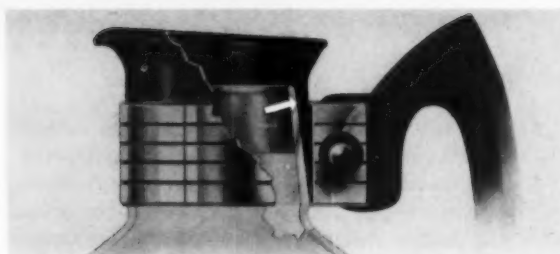
The base of the machine is (To page 154)

PART is removed from mold. In foreground operator cements molded bosses to side of cover.





DISASSEMBLED glass coffee maker with molded polypropylene pouring lip and heat-resistant phenolic handle removed. Metal band is fastened in position by handle clamp screw after pouring lip has been positioned on the neck of the jar.



CUT-AWAY NECK detail of Majestic model glass coffee brewer, showing how O-ring seats in internal groove (arrow) fabricated in lip after molding.

Unbreakable spouts — for less

*By specifying molded polyolefins, this company saved
expense of stainless steel and gained greater design flexibility
without sacrifice in product identification*

Problem: Develop a new type of pouring lip for coffee makers which will 1) eliminate chipping and breakage experienced with glass pouring lips; 2) be less costly than a lip fabricated of stainless steel; 3) open up fresh design possibilities for products of this type; 4) and allow users to convert existing units to the new design at nominal cost.

Solution: Injection mold the lip of polypropylene or linear polyethylene.

This, in capsule form, is the story of Cory Corp.'s new Super-Tuf pouring lip, which made

its first appearance on the company's Majestic commercial model glass coffee maker late in 1958. In modified designs, the plastic lip has now also been adopted for Cory's 12-cup Perc Royale stainless steel percolator and serving decanter, and the new Jubilee percolator, an 18-cup stainless steel automatic electric model just reaching retail market outlets.

Before the original spout went into production, a number of questions had to be answered: what tasteless, odorless plastic would not only resist chipping and breakage under heavy-duty

commercial usage, but could also endure repeated contact with water and coffee near the boiling point without softening, deforming, or staining? Another stickler: how to accomplish a firm, leak-proof seal between the plastic pouring lip and the neck of the heat resistant glass bowl, whose dimensional tolerances could not be held under $\frac{1}{32}$ of an inch.

What management thought

Cory executives, familiar with metal pouring lips used by some other manufacturers, did not feel that the combination of glass and stainless steel was the best answer to the breakage problem. "We figured," says Cory president J. W. Alsdorf, "that what we had seen in metal did not do an adequate job. We also felt that if we could find the proper qualities in plastic we might effectively marry it to glass and achieve an end product that was lighter, more durable in use, more economical to manufacture—and one which offered a great deal more style and design flexibility than could ever be accomplished in metal-to-glass construction."

While pouring lip breakage was a major problem to be overcome, Cory designers were also aiming at a much thinner lip than was possible with glass, so that the unit would pour better and without dripping. Also, they knew that a semi-flexible pouring lip, replacing the hard, rigid glass lip, would be less likely to cause damage by striking the phenolic head which a number of years ago replaced a magnesium head used on the company's automatic coffee brewing equipment.

To attach the pouring lip to the glass bowl, it is slipped over the glass neck and held in place by a stainless steel band. For a tight seal between the pouring lip and the bowl neck when the stainless steel band is applied, some sort of resilient gasket was required between the glass and plastic surfaces. Cory engineers solved this problem by specifying an internal groove in the plastic part (see photo, left) into which a rubber O-ring may be inserted. With this pre-mounted "doughnut" inside the plastic component, the piece is moistened and slid into position on the glass throat, and is retained in (To page 156)



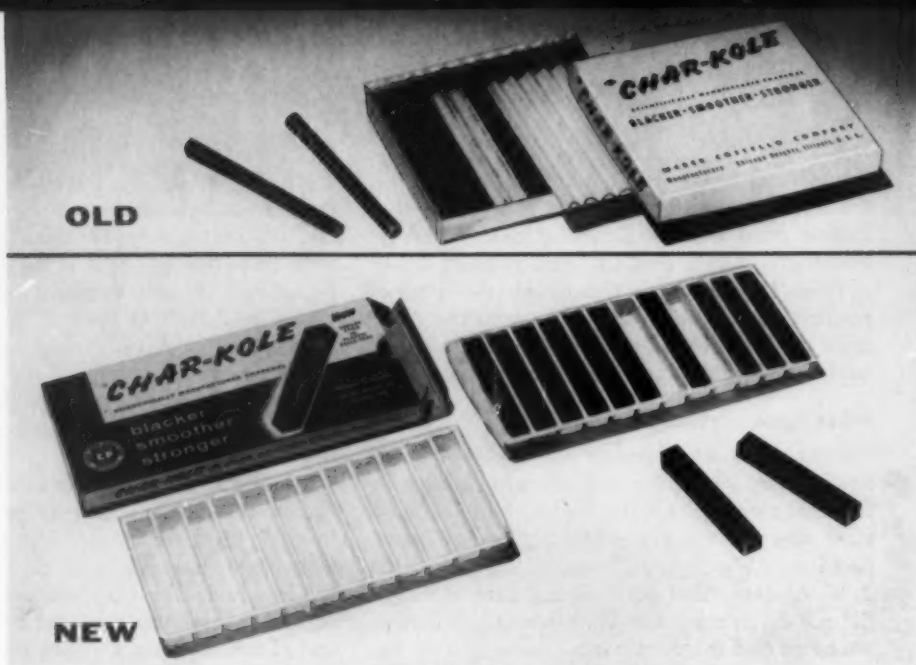
CLOSEUP VIEWS of polypropylene lip for glass coffee brewer (left) and larger lip, molded of linear polyethylene, used on Cory's stainless steel Perc Royale percolator and serving decanter. Four lugs on larger lip facilitate attachment of handle. Rubber O-ring in foreground serves as gasket for the polypropylene lip.



TOUGHNESS and high temperature resistance of linear polyethylene resulted in its adoption in pouring lip for the 12-cup Perc Royale stainless steel percolator-decanter.

ON NEW JUBILEE 18-cup automatic percolator, injection molded polypropylene pouring lip provides interesting color contrast and makes possible a complete new design approach. Hinged lid is also of polypropylene. General-purpose phenolic is used for base and handle.





VACUUM-FORMED high-impact styrene trays (front) replace former set-up box with corrugated paper inserts used for packaging Char-Kole sticks. Plastic tray is more convenient to handle, easily cleaned, and eliminates breakage problem.

Dual-purpose thermoform

*Manufacturer of artists' supplies turns to formed impact styrene
to make a package that doubles as working tool—
and gives better protection at lower cost*

Functional packaging is particularly important to a manufacturer of art supplies, which are relatively fragile and require effective protection against breakage and smudging in shipment and handling. That's why Weber Costello, Chicago Heights, Ill., has turned to modular formed trays for its full line of pastel sticks, water crayons, and related items, and why molded styrene boxes are used to hold individual cakes of color.

Weber Costello's new approach to its packaging problems was triggered by the redesign of its Char-Kole package. The previous unit was a relatively expensive set-up box, consisting of base and cover, containing a strip of die-cut corrugated paper in whose parallel troughs rested round charcoal sticks. A second piece of corrugated and a layer of cellulose padding were laid on top. Despite the corrugations, the

fragile sticks jostled together in shipment, and breakage was high. Further, smudges on the corrugated inserts, not easily removable from the porous material, gave the opened packages an unattractive appearance when they were displayed for customers' inspection.

What thermoform accomplished

Changing over to a square section Char-Kole stick and a formed Palle-Tray provided a more functional and attractive product and package. Cavities in the tray are deep enough for secure nesting of the charcoal sticks, isolating each stick, and eliminating any possibility of contact which might cause breakage. If soiled by the charcoal, the plastic tray can be easily wiped clean; its non-porous surface does not absorb the dark smudges. Unlike the previously used corrugated insert, the self-supporting styrene



OTHER EXAMPLES of modular Palle-Tray package used for pastels and Watercrayons. Use of standardized vacuum-formed trays of variety of products in 12-, 24-, and 48-unit counts simplifies packaging program. Old type hinged paperboard package, supplanted by folding cartons, is shown in background. Note acetate sleeves on Watercrayons.

REDESIGNED TRAY eliminates individual aluminum containers and is covered by sliding transparent butyrate top, which grips edges of base. Important cost and weight savings were effected through redesign.

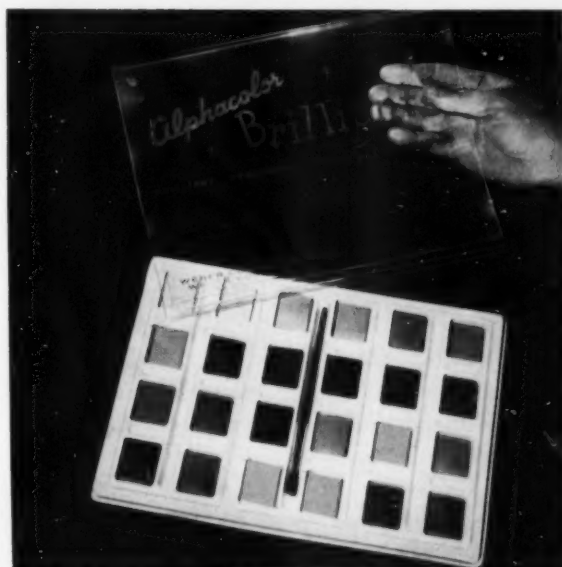
tray can be removed from the carton and placed within convenient reach of the artist.

Similar results were achieved by adapting the new package design to Watercrayons and round or square pastels.

A major advantage of the new thermoformed trays is the use of modular sizes which facilitate packs in convenient multiples of 12, 24, or 48 units. By utilizing standardized compartments which fit several stick-type products, Weber Costello has greatly simplified package inventory problems and packaging operations.

All trays are vacuum formed in a 24-cavity mold, using 0.025-in. Midlon high-impact styrene sheet stock supplied by Midwest Pacific Products Co., Chicago Heights, Ill. Fabricator is Poster Products, Inc., Chicago. Smaller size trays are produced by die cutting the basic 24-cavity units. Thus, one mold is used to produce three different size trays.

For more convenient smudge- (To page 158)



NEW

ON REGULAR SIZED Brilliants, thermoformed tray with paperboard sleeve was formerly used. Individual aluminum containers, filled with color concentrates, snapped into the tray cavities.

OLD



* *Proof* With One Plastic Success After Another...

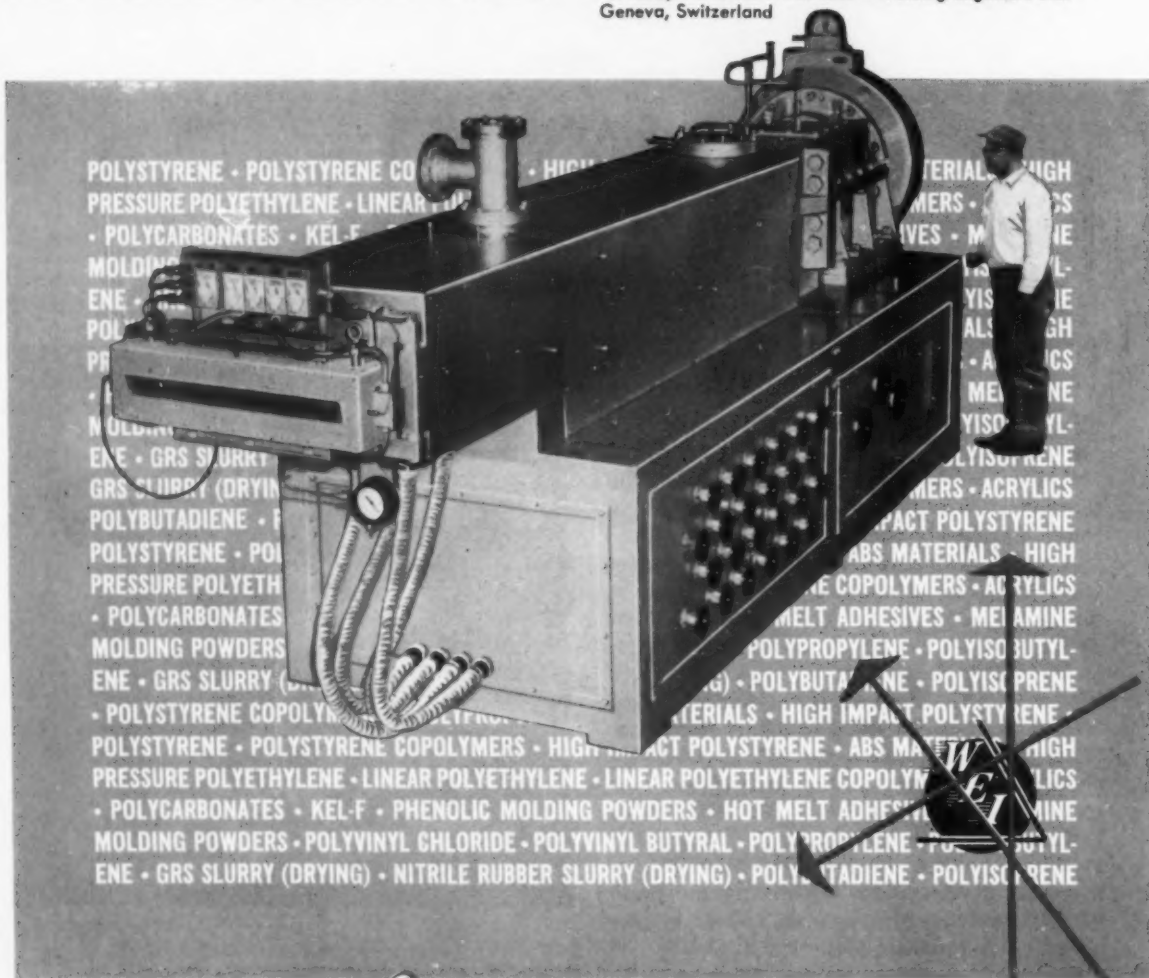
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Surface treatment of PE film by electrical discharge

By H. E. Wechsberg[†] and J. B. Webber[‡]

A new quantitative, reproducible test of film adherability was the basis for a study of the influence of film treatment factors on the peel strength of bonds formed between treated films and a treatment-sensitive adhesive. Main conclusions: 1) peel strength increases sharply with treater gap-voltage, drops off as the air gap widens and the film speed increases; 2) 0.04% of slip additives oleamide and ethylene-bis-stearamide strongly affected the peel strength, oleamide raising it and EBS reducing it; 3) heat-seal strengths were reduced one-third by treatment that gave five-fold improvement in peel strength.

Of the various processes for rendering polyethylene films receptive to the printing inks and adhesives in general use, only flame treatment and electrical discharge methods have gained significant commercial acceptance. Boxler *et al.* (1)¹ have made a study of flame treatment, but little published data are available about the factors involved in the electrical discharge method.

This paper represents an initial study of the main variables relating to this method, and of the important effect of slip additives.

Apparatus

The treater used in the present study was a commercial unit (manufactured by A. Mancib Co.,

¹Reg. U.S. Pat. Off.

²From a paper presented at the 15th Annual Technical Conference of the S.P.E., New York, Jan. 1959.

[†]Present address: Monsanto Chemicals Ltd., Fulmer Halls Laboratories, Fulmer, Slough, Bucks, England. Work was done while author was on assignment to Monsanto's research laboratories at Springfield, Mass.

[‡]Monsanto Chemical Co., Plastics Div., Springfield, Mass.

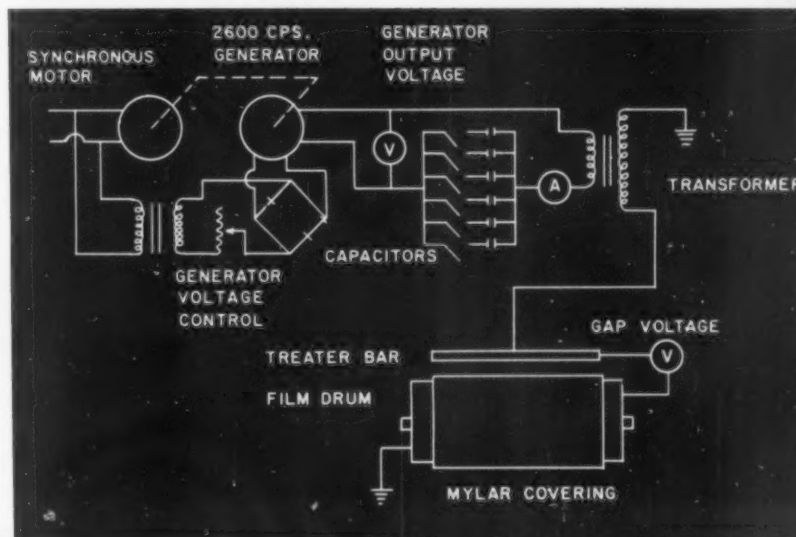
¹Numbers in parentheses link to references at end of article, p. 160.

Cambridge, Mass.) consisting essentially of a high-frequency a.c. generator driven by a synchronous motor, a transformer, and a bank of capacitors for controlling the primary voltage and, in turn, the voltage supplied to the treater bar. Figure 1, below, is a simplified diagram of the arrangement. The electrode system consists of

two main parts: 1) a steel blade set in an insulated (acrylic) holder, hinged to facilitate start-up, and adjustable in relation to 2) the grounded 5-in.-diameter, steel treater roll, which was covered with a 10-mil buffer layer (five wrappings of 2-mil Mylar film). A general view of the whole apparatus is shown in Fig. 2, p. 102, and details of the electrode system in Fig. 3, p. 102.

The commercial treater was modified by replacing the supplied ammeter with a more sensitive instrument and by interposing a voltmeter between treater bar and roll in order to measure the potential drop across the electrode gap. For reasons of size and convenience a Multimeter (Triplet, Type 630) was used; however, since this and similar instruments

FIG. 1: Schematic diagram of treater.



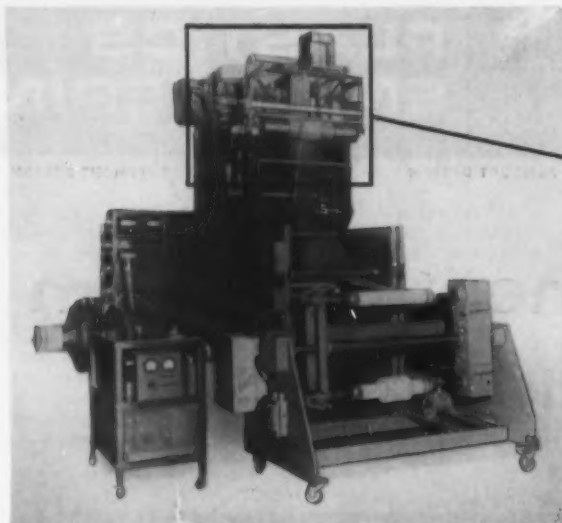


FIG. 2: General view of treating apparatus. Boxed area is shown in detail in photo at right.

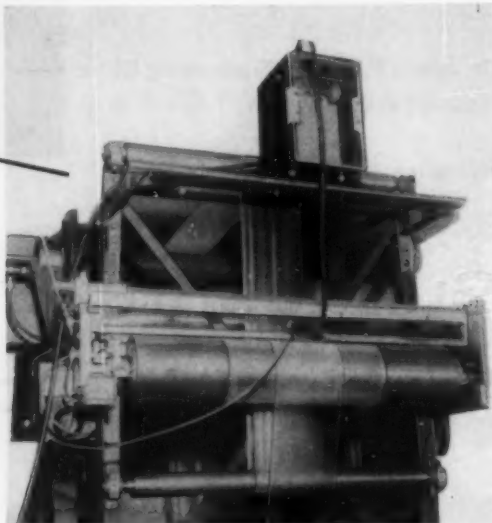


FIG. 3: Closeup of the treating apparatus, showing details of the electrode system.

are generally intended for use near the normal frequency of 60 cycles, the Multimeter was calibrated against an electrostatic voltmeter (General Electric, Type 32 C 300 G., frequency-independent up to 1 mc. and the voltages quoted relate to this latter instrument.

Materials and film preparation

The polyethylene resins were all of the "high-pressure" type, and are described in Table I, below.

Films were extruded into 6.25-in., layflat, 1.25-mil, blown tubing, using a 1.5-in. extruder with a 4-in. circular die and stock temperatures of 370° F. In the study of slip additives, the base material was Resin A.

Procedure

Surface treating was carried out by passing the films through the electrode gap at a speed of 30, 60, 90, or 120 ft./min., and applying one of several potentials be-

tween 0 and 8000 v. to the electrodes by bringing one or more capacitors into circuit and using the generator field-rheostat for fine adjustments. Unless otherwise stated, the standard air gap, i.e., distance between blade edge and top film surface, was 0.027 inch.

Films were treated either "in line" immediately after extrusion and collected on a constant-tension, two-station wind-up, or were treated 24 hr. after extrusion.

Test methods

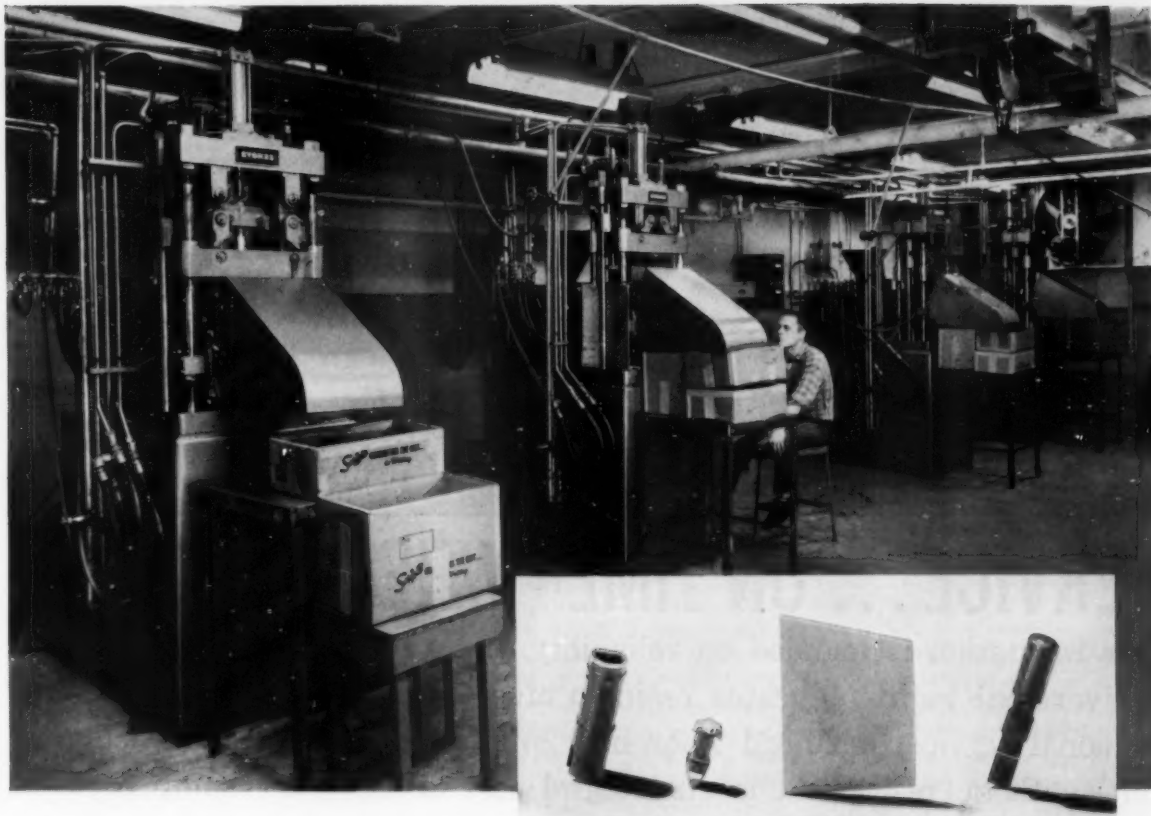
Degree of treatment and ink adhesion: Although various methods have been proposed from time to time, no satisfactory quantitative test (for measuring degree of treatment) existed at the start of the present investigation. The two methods generally quoted in the literature are either the pressure-sensitive-tape test, or the Chapman test (2). In the first of these, a strip of pressure-sensitive tape is applied to the inked, dried surface of the polyethylene film, then rapidly pulled off, and the amount of ink removed regarded as a measure of adhesion. The actual test procedure has recently been standardized by the S.P.I. (3), but the method, while extremely useful for control purposes, is at best still only semi-quantitative and the differences obtained in the

rather narrow range between no adhesion and complete adhesion are as much a measure of unevenness in tape or ink application as of intrinsic affinity between film surface and ink layer. The method suffers from the additional limitation of not being able to detect overtreatment.

In Chapman's test the printing ink is used as an adhesive between two treated surfaces and the peel strength of the resulting laminate determined. The test is thus, in principle, a quantitative one, but appears to give very poor reproducibility; this has led Boxler *et al.* (1) to introduce modifications of ink-application technique and other experimental details, which improve accuracy but still require integration of the force-distance curve to give interpretable results. A serious practical disadvantage common to both the original and modified Chapman tests is that prolonged drying at elevated temperatures (16 hr. at 60° C.) is necessary to remove all solvent from the polyethylene-ink-polyethylene laminate. This is not only inconvenient but can also complicate interpretation of results obtained with films containing migratory additives. In view of the limitations inherent in existing methods, a new test was developed for measuring the degree of treatment of a polyethylene surface. Essentially, the

Table I: Polyethylene resins tested

Resin	Melt index	Density
A	3.0	0.916
B	1.8	0.916
C	7.0	0.926



Scripto
INC.

selects Stokes 701 injection machines for truly automatic, high speed production

Scripto, Inc., Atlanta, Georgia—one of the country's best known makers of ball point pens, fountain pens, and automatic pencils—has augmented their large array of semi-automatic machines with Stokes fully-automatic presses. Four Stokes Model 701 Automatic Injection Molding Presses were selected for fully automatic operation, positive ejection and high speed operation.

Three are molding miniature parts out of Nylon for Scripto's famous ball point pens. The fourth machine is producing a panel of acrylic for their "visible fuel supply" cigarette lighter. All are in operation 24 hours a day.

Uniformity of cycle and production meets Scripto's high quality control standards . . . and truly

automatic operation permits one-man supervision of all four presses.

Here, as in hundreds of other installations, the Stokes 701 2-ounce press is proving the advantages of its outstanding design and operating features. The patented ejection system positively clears parts and scrap, and sorts into separate bins. Positive nozzle shut-off with precompression in the cylinder decreases pressure loss . . . increases plasticizing capacity . . . provides faster filling of cavities . . . and eliminates "drool" and "strings". The self-contained vertical design of the 701 saves floor space . . . permits easy supervision . . . and facilitates set-up and change-over.

Write for literature on the Stokes Model 701—ask for a Stokes production analysis on your own parts

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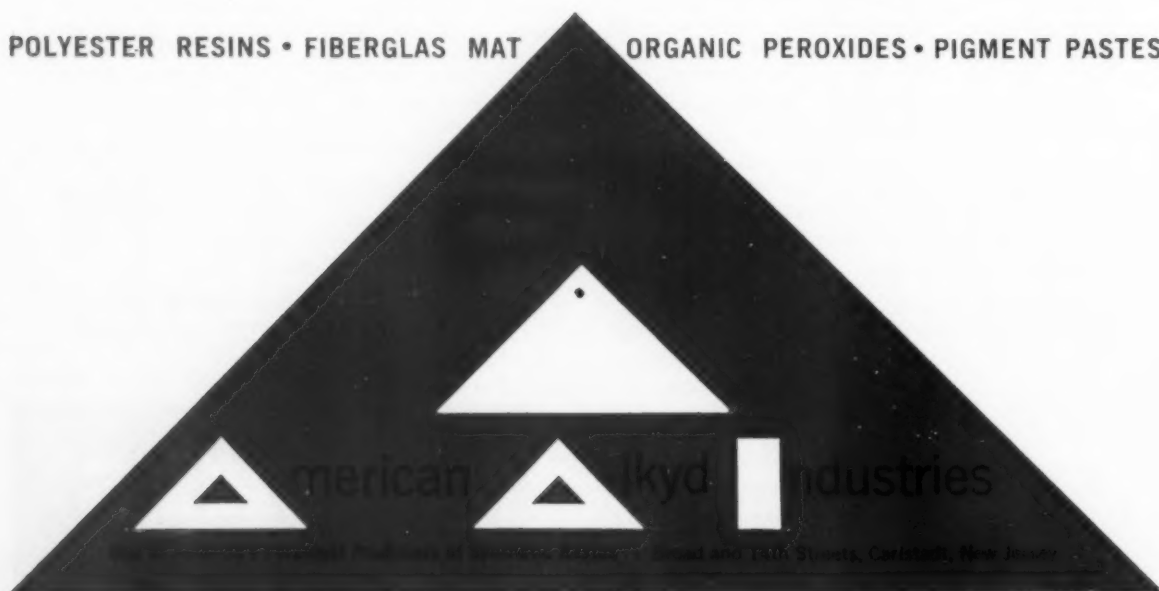


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POLYESTER RESINS • FIBERGLAS MAT

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basis of the test is the use of a solvent-free, pressure-sensitive adhesive which, like printing ink, has low affinity for an untreated surface but adheres strongly to treated surfaces. For bond failure always to occur at the polyethylene interface, it is necessary that the pressure-sensitive material should have high cohesion and, if used in tape form, very good adhesion to its backing or carrier tape.

A number of formulations were made up in the laboratory but it was subsequently found that a commercially available pressure-sensitive tape had exactly the desired properties and this was used throughout the present work (No. 800 Acetate Film Tape, blue; $\frac{1}{2}$ in. wide; Minnesota Mining & Mfg. Co.).² The tape is applied to the polyethylene film and the assembly briefly clamped together under standard conditions of pressure and time. The laboratory heat sealer described below was found very convenient for this purpose. The instrument was run

²No. 800 blue is no longer available from Minnesota Mining. No. 800 black acetate film tape should be specified. This has the same adhesive as the blue and will give similar results.

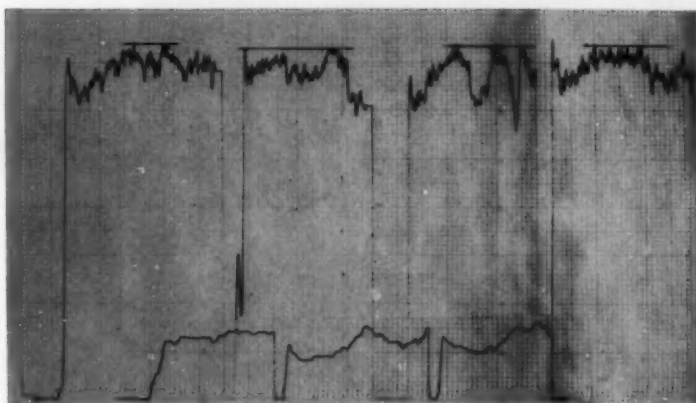


FIG. 4: Typical results of peel strength test on treated (top) and untreated PE film, as measured on an Instron Tensile Tester.

at room temperature, with a constant jaw pressure of 30 p.s.i. and a dwell time of 2 seconds. Under these conditions, the peel strength of the assembly is about 200 g./in. for an untreated film and 1100 g./in. for a very highly treated film, with appropriate intermediate values. A backing tape should be used with thin films to avoid errors due to film stretching. The test reproducibility is very good, and using only three

or four samples, it is readily possible to distinguish between films whose average adhesion values differ by 30 g./in. or less. Any suitable tensile machine can be used for the peel strength determinations. Figure 4 shows results obtained with an Instron Tensile Tester. The superimposed lower curves refer to an untreated film, and the upper curves to the same film after an intermediate level of treatment (To page 108)

FIG. 5: Effect of voltage on degree of treatment.

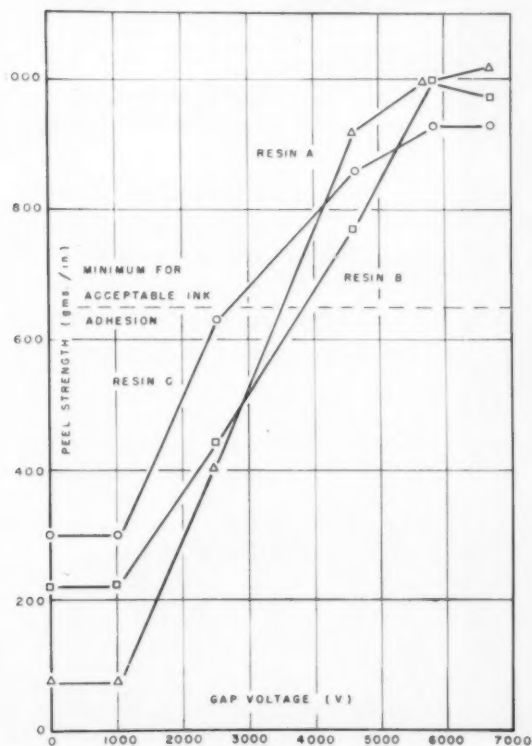
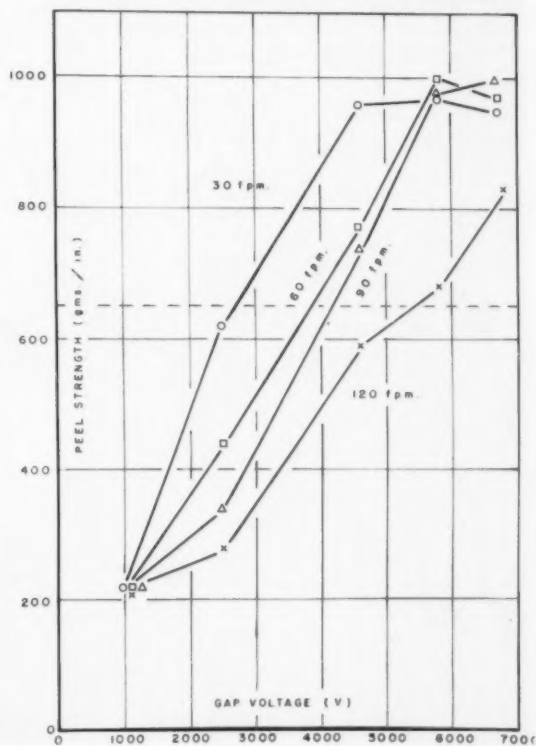
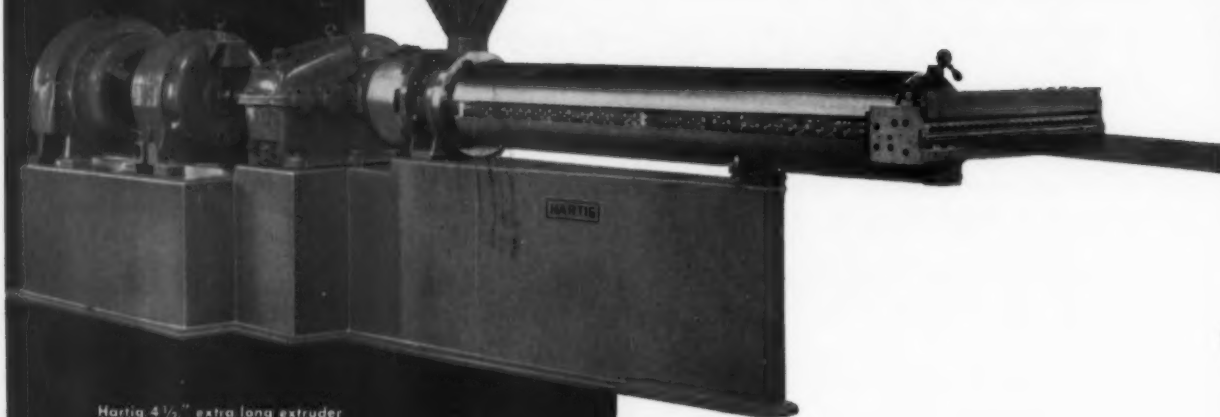


FIG. 6: Effect of film speed on degree of treatment.



HARTIG precision



Hartig 4 1/2" extra long extruder
24:1 L/D, with sheeting die.

Effective Screw Length: 108 1/4"
Nominal Capacity: 300-310 lbs./hr.
Barrel Heat: 19 bands, 3200 W ea.
Control Zones: barrel 5, die 1
Temperature Controls: 6 (proportioning)
Thrust Bearing Capacity: 279,500 lbs.
Floor Dimensions: 203" x 82"
Weight (approx.): 8500 lbs.
Motor Drive (belt): 50-150 hp.

Hartig units are now processing high and low density thermoplastic materials of all types for:

**Film Extrusion—Blown Tubing,
Extrusion-Coating**

Sheet Extrusion—Vacuum Forming

Profile Extrusion—Wire Coating

Blown Containers—Molding

Compounding—Reprocessing

Some significant Hartig features are: unexceeded capacity; choice of 4 L/D ratios; unvented or vented for removal of moisture, solvents, or monomers; interchangeable screws designed for processing specific materials; instruments for close control of quality, and automatic operation.

Facts and figures—as they apply to your own operation — are available without obligation.

extrusion pays off

3 WAYS

1

BETTER PRODUCT

Precision extrusion gives uniformity and reproducibility, particularly important in extrusion of sheet for sheet-forming and tubing for blow molding. Eliminates rejects due to thin spots, thick sections, or porosity.

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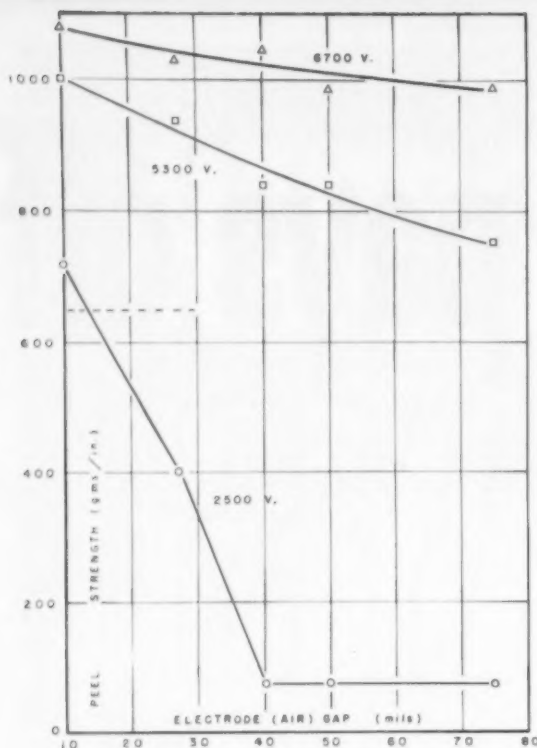


FIG. 7: Effect of electron gap on the degree of the treatment.

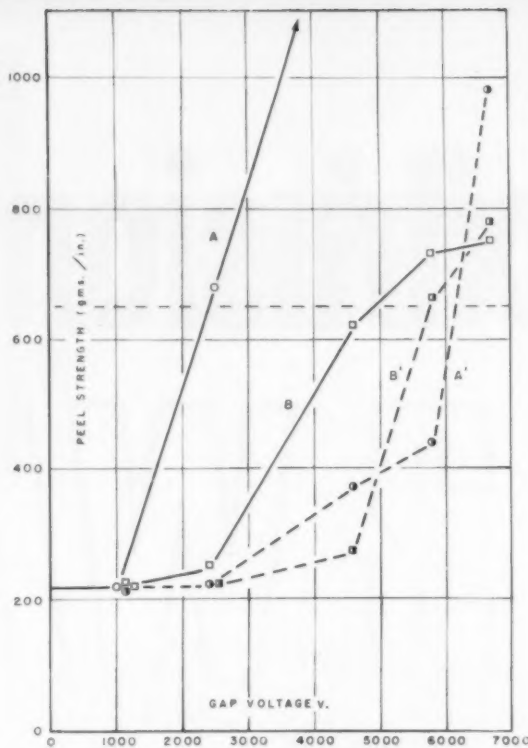


FIG. 8: Effect of slip additives on the degree of the treatment.

(full chart scale = 500 grams). The test is not greatly affected by wide variations of peel rate and angle, and very satisfactory results can be obtained by simply taping the assembly to the edge of a direct-reading pan balance and using a slow manual pull. The peel-strength data quoted in this paper are the medians of the peak values obtained from four samples.

Since commercially available inks, even of the same type, differ in their adhesive properties, no universal correlation with tape adhesion is possible. However, using the S.P.I. standard flexographic ink and test method, satisfactory adhesion was found to correspond to a minimum peel strength of about 650 g./in. This value has been independently confirmed by the Printing Ink Division of Interchemical Corp., to whom film samples with varying degrees of treatment were submitted. A series of functional adhesion tests, based on extensive field experience, were used in their evaluation. Thanks are due to Dr. D. J. Bernardi of Interchemical Corp. for arranging these tests. It should be pointed

out, however, that the 650 g./in. minimum is not universal—some applications require more adhesion than others and a realistic working minimum should be established for each. Also, since lots of tape vary in their adhesive quality, it is wise to test each on untreated film, using the ratio of treated-to-untreated peel strength, rather than simply the treated strength, as the control criterion.

Heat seal test: The bar sealer of a Sentinel Heat Sealing apparatus, Model 12-12ASC, was used under the S.P.I. standard test conditions of 30 p.s.i. pressure and 0.5 sec. dwell time. Sticking was prevented by the use of cellophane sheets. Poor reproducibility of tensile strength results obtained on heat seals prepared from 1.25-mil film led to the adoption of 2-mil film (prepared as described on p. 102) for this phase of the work. Heat-seal strength was measured between treated surfaces, and specimens were taken along the machine direction of the film.

Slip tests: Values of dynamic coefficients of friction were determined between treated surfaces,

using the moving-sled method. (Sled weight 500 g., speed of travel 5 in./min.)

Results and discussion

Mechanism of the treating process: Application of voltage such as those used in the present experiments results in the ionization of air in the electrode gap and consequent production of charged particles which, under the accelerating influence of the applied potential, bombard the effective electrode surfaces, i.e., the polyethylene film and the steel blade. Extensive literature exists dealing with the effects of charged particles on polyethylene (4) and it is well established that the general results are oxidation, unsaturation, and crosslinking, with the preponderance of a given effect depending on particular experimental conditions. It is believed that cross-linking is responsible for heat-seal degradation, whereas oxidative and unsaturation processes are responsible for the increase in surface polarity which is a prerequisite for wetting and adhesion (5, 6, 7).

The over-all effect of surface treatment may, therefore, be re-

Table II: Effect of treatment on heat seal strength

Applied voltage	0	1000	2500	4600	5800	6700
Tape adhesion (g./in.)	170	170	400	920	1060	1100
Heat seal (g./in.)						
250° F.	1770	1640	1550	1370	1180	1180
300° F.	1820	1730	1550	1370	1320	1140
350° F.	1960	1770	1680	1500	1370	1180

garded as a composite of two functionally opposed reactions. Both of these reactions are primarily dependent upon the voltage applied to the electrode gap, and the experimental results below show this to be the case.

Effect of applied (gap) voltage:

The results of increasing voltage on different films treated at 60 ft./min. are shown in Fig. 5, p. 105. The degree of treatment is roughly proportional to voltage until a limiting value is reached. There is some evidence (see also Fig. 6, p. 105) that higher voltages may actually decrease adhesion. Tests over a wide range of conditions showed that, at a given potential across the gap, the degree of treatment was independent of the combination of capacitors and generator-output voltage used to establish that potential.

The nature of the resin appears to have only a slight effect on the rate at which adhesion increases with applied voltage, though the medium-density Resin C shows a smaller total adhesion increase than the low-density Resins A and B. The initial differences in adhesion are probably related to physical rather than chemical surface differences.

Variation of treatment with film speed: The experimental results are summarized in Fig. 6, which indicate a tendency for treatment to fall off fairly rapidly with film speeds above about 100 ft./min. For treatment at higher speeds, the alternatives are to use either increased voltages or several treaters in tandem. It is not yet clear which of these methods is better, particularly in applications where heat sealability is a consideration (see below).

Influence of electrode gap:

Changes of treatment resulting from air gap variations were examined at three levels of applied voltage and the results are shown

in Fig. 7, p. 108. The film speed in these experiments was 60 ft./min. As expected, the effects of applied voltage decrease with distance, but it is evident that no simple correlation exists between degree of treatment and the potential gradient (v./mil) across the air gap. However, the data indicate the permissible order of magnitude of factors which influence the air gap setting, e.g., uneven blade adjustment, film-gage variation, treater roll eccentricity, and overlap of buffer-layer wrappings.

Heat sealing of treated film:

It is well known that printability treatments generally result in some loss of heat-seal strength, and Table II, above, shows the results obtained with Resin B treated at 60 ft./min. and heat sealed (PE treated to treated side) at 250, 300 and 350° F.

In all samples treated at 4600 v. or above, bond failure occurred by peeling; other samples failed by rupture at heat-seal boundary.

The heat-seal degradation resulting from increasing treatment is quite evident at all three temperatures and varies approximately linearly with applied voltage in a manner very similar to that found for adhesion. It is particularly interesting to note that a small but definite decrease in heat sealability occurs even under treating conditions which have no detectable effect on adhesion

properties. Boxler *et al.* (1) have demonstrated that severe heat-seal degradation can also occur with flame-treated film, but have shown that this degradation can be greatly minimized or avoided altogether by multiple passage through the flame treater under conditions which, at a single pass, would not produce adequate printability. Further work is in progress to define more clearly the conditions under which the "printability reaction," as distinct from cross-linking, occurs with the electronic technique. The present data indicate, however, that these conditions, if found, are likely to be fairly critical.

Effect of slip additives:

Film processors frequently report difficulties in treating polyethylene film containing slip additives, particularly when there is an appreciable time interval between extrusion and treatment. Fig. 8, p. 108, shows this effect demonstrated in laboratory experiments using conventional slip additives. Curves A and A' refer to films prepared from a resin containing 0.04% oleamide, curves B and B' to films containing 0.04% ethylene-bis-stearamide (8). Films A and B were treated "in-line," Films A' and B' were treated 24 hr. after extrusion as described above. Film speed was 60 ft./min. in all cases. The observed difference between "in-line" and "feed-back" treatment is of great practical importance; it is caused by the time-dependent migration of slip additive to the film surface, where it forms a protective barrier which reduces the effects of the charged particle bombardment. The difference between treatability "in-line" and "on feed-back" is much greater with oleamide than with (To page 160)

Table III: Coefficients of dynamic friction of film containing 0.04% oleamide^a

Applied voltage (v.) (film speed 60 ft./min.)	Treated "in-line"	Treated 24 hr. after extrusion
0	0.29	0.29
1000	0.29	0.28
4600	0.22	0.31
6700	0.18	0.39

^aA difference of 0.04 in. in coefficient of dynamic friction is significant with the system of measurement used in this work. Coefficient for base resin without additive was greater than 1.0.

Problems with premix molding – Part 3

How to cope with sticking in the mold, warping, delicate inserts, very large inserts, and thin-wall problems

By R. B. White[†] and R. S. Jackson[‡]

A few years ago, sticking in the mold was a particularly annoying and recurrent problem to the polyester premix molder. Now, however, with properly formulated compounds available, and with correctly designed (and well built!) tools, the polyester premix molder may expect to mold with relative freedom from troublesome sticking.

Many of the causes of sticking in molds are well recognized and apply to all molding compounds. Unsuspected undercuts in the mold will cause the piece to "hang up." Poor mold finish on no-draft surfaces is quite apt to cause sporadic sticking as well as parts of inferior appearance. Sloppily actuated ejector plates can cause cocking of the part with attendant difficulties in ejection.

The relatively low shrinkage—1 to 3 mils/in.—of polyester glass premixes intensifies all of the normal sticking problems. This means that all of the problems with undercuts and cocking are greatly magnified. Greater care in mold construction and maintenance must be exercised if these problems are to be eliminated.

While it is true that in many cases it may not be necessary to put as much "beef" into a polyester premix mold as is required for high-pressure materials, it is our feeling that, if high-quality parts are to be made with minimum production difficulty, there should be no sacrifice in mold accuracy and finish. It may be well to observe that mold finishers frequently create very slight undercuts unintentionally while polishing; while this condition might go

undetected in molding phenolics, it is quite apt to cause sticking with the lower-shrink polyester premix materials.

Sticking may frequently be traced to incorrect break-in of the mold. During the break-in period, any material which adheres to the mold, whether from the part itself or the flash, must be carefully and completely removed after each shot and the mold relubricated with carnauba wax or silicone mold spray, with particular attention to the area which shows the sticking. This should be continued until each such area no longer shows any sticking. Good materials, in hardened, plated, and properly polished tools, will run clean after 10 to 20 shots, and all flash in production will be removable simply with an air nozzle.

If the sticking occurs suddenly or erratically, there are two additional likely causes: 1) the mold temperature may have dropped or the job may have been set up with the temperature in a marginal range, and 2) moisture may have gotten into the compound. The second possibility is most likely if the compound has been stored under refrigeration or in a cold area and is opened without warming to room temperature. Moisture which condenses on the compound from the air is enough to cause severe sticking.

Warping

Glass-reinforced premix compounds offer all the usual warping problems of conventional compression molding, plus some special ones of their own. Two principal factors will be observed: 1) Any nonuniformity of glass distribution will cause local warping and waviness, as illustrated

in Fig. 26,¹ below; 2) Any angular corner in a part will come out of the mold sharper than the angle built into the mold; therefore, to produce a 90°-angle part, the mold must be constructed to form and hold the compound during cure at approximately 93°. The simple box shown in Fig. 27, p. 113, shows how this effect is reflected, where several angles are working against each other.

To understand this behavior, we must recognize that the rate of cure of polyester premix materials is very fast in relation to their rate of heat transfer through the material. As a result, the layers

¹Figure numbers are continued from Part 2 of this article, which appeared in our May issue.

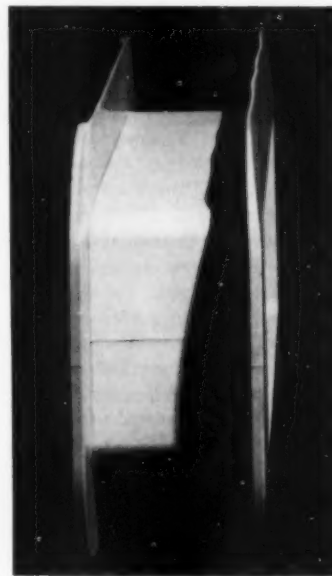


FIG. 26: Coil form flange shows characteristic waviness in thin-wall sections resulting from non-uniform glass distribution in the final molding operation.

[†]President and [‡]Chief Engineer, The Elastic Corp., 4321 Glenridge Rd., Cleveland, Ohio. Part 1, dealing with strength variations and voids, appeared in *MP*, March 1959, p. 117; Part 2, which discussed cracks, ran in *MP*, May 1959, p. 115.



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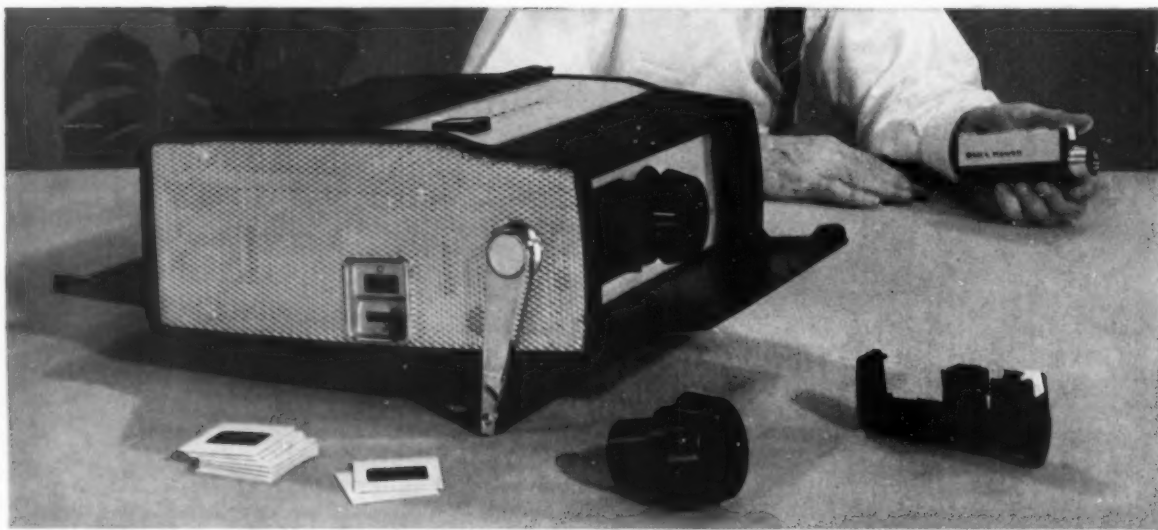
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FIG. 27: Rectangular instrument case shows typical dishing in of sides, which results from end and bottom angles sharpening up as described under Fig. 29. This condition is corrected in this instance by allowing part to cool in overcompensated position forced by simple fixture plate shown.

of material next to the mold surface will be found completely set up before the interior has gotten warm enough to start curing. In addition, the glass fibers in these premix materials make such cured surface layers almost completely resistant to shrinkage even before the cure is completed. The result in a rectangular cross section is seen in Fig. 28, above, where the length of the outside surfaces is almost unchanged from the mold dimensions, but the thickness has reduced considerably in response to the shrinking of the resin as it cures.

Figure 29, right, shows how this difference of shrinkage translates itself into warping of a 90° angle. Note that sharpening or pulling in of a molded angle is bound to result from retaining the "string length" of the surfaces around the bend (a-a-a and b-b-b) while at the same time reducing the thickness (from a-b to a'-b'), during cure.

Empirically the correction needed for this has been found to

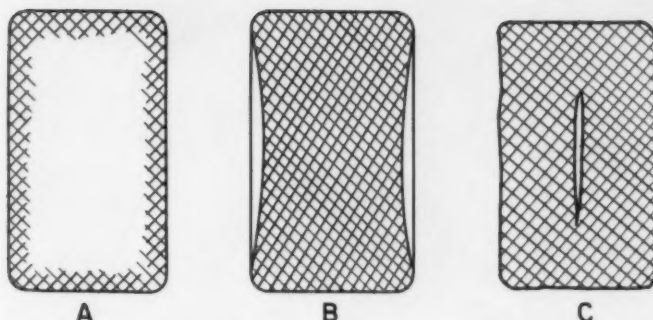


FIG. 28: Cross section of partially cured piece. Glass reinforcement in premix compound prevents cured outer shell from shrinking as remainder of cross section shrinks during cure. Note unchanged outer periphery in final cured part as seen in B and C. This is a primary cause of warpage problems with glass premix parts.

be approximately 2° to 3°, although it will vary with the design of the part, the glass content, reaction rate of the compound, and the mold temperature.

Of course, warping is not limited to closing-in of angles and it is not always possible to "fake" the molds to correct for warpage. So called shrink or cooling fixtures, which are used to force each part to (or beyond) the desired shape while still hot immediately after molding and hold it there until cool, are generally quite effective with polyester parts. A very simple example is seen in cooling plate shown in Fig. 27. Shrink fixtures will seldom fully correct for warping, however, and the benefits are usually completely lost if the parts are subsequently heated to temperatures above 200 to 300° F. (depending on the resin used). Where such temperatures are to be encountered, as with the brush holder ring seen in Fig. 30, p. 114, it is better to avoid the use of restraining fixtures and machine any critical surfaces on the parts after molding—preferably after post baking—to insure permanent accuracy of such surfaces.

Delicate Inserts

Polyester premix compounds are usually quite soft and hence less likely to push inserts out of place or out of shape than conventional phenolic or melamine compounds. But, they should not be confused with casting-embedment procedures, where this problem is almost non-existent.

Figure 31, p. 114, illustrates a

problem of this kind. Displaced segments, as seen in the photo, could not be avoided during the first attempts to mold these parts with a standard formulation of ½-in. chopped-glass premix. This displacement obviously resulted from the drag and thrust built up by the fibrous glass compound as it was forced through the 0.020-in. slots between the segments.

Reformulation of the compound used in this commutator with much lower glass and filler content gave a more fluid mix, and helped the segment-displacement problem. However, it accentuated the problem of shrinkage inside this large ring insert. Ultimately

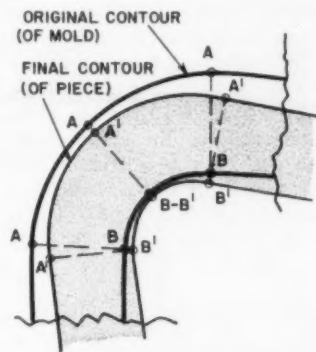


FIG. 29: Sharpened angle at corner results from "freezing" shrinkage of surface layers before general shrinkage of internal mass has taken place. (See Fig. 28). String length of surface A'-A'-A' has remained unchanged during cure, whereas the thickness of A'-B' has been reduced by the normal shrinkage of these materials during cure.

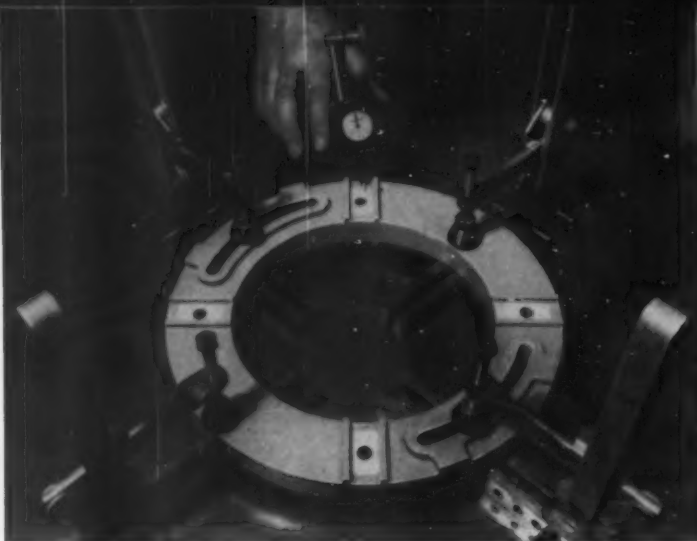


FIG. 30: Precise accuracy of brush mounting surfaces is obtained on this d.c. motor yoke by milling mounting pads, after a stabilizing heat treatment. Machined surfaces can be seen in this part, which is being held in checking fixture as it will be held in final assembly.

both problems were corrected at once by the two-stage molding technique described below.

Large inserts

The problem of shrink inside large inserts is certainly not peculiar to reinforced premix moldings. In fact, the relatively low external shrink and great toughness of these materials greatly favors their use where large hollow inserts must be securely anchored to an internal molding. For this very reason, such jobs are frequently thrust upon the premix molder and some comments may be useful.

The commutator section shown in Fig. 31 illustrates an example of this. The void seen along the inside face of the large insert (see arrow) was intolerable. To eliminate it, two-stage molding was resorted to (Fig. 32, right). An inner molding is made first,

which can itself cure and shrink to a stable dimension before the outer molding is made; then an outer molding of relatively small cross section finishes the job. The proportionately small shrinkage stress in the outer molding is easily supported by the more massive inner molding. This procedure also allowed a much wider choice of materials to overcome the problem of insert spreading in the outer molding.

Figure 33, p. 116, illustrates a similar problem where very large diameter annular rings are molded around inserts. When a thermosetting plastic cures, it shrinks and pulls away from the surfaces of its mold, or any similar metal enclosure like an annular ring insert. Shrinking away from the mold is useful: it permits us to get parts out of the mold. But shrinking away from an annular insert often leaves a perfectly

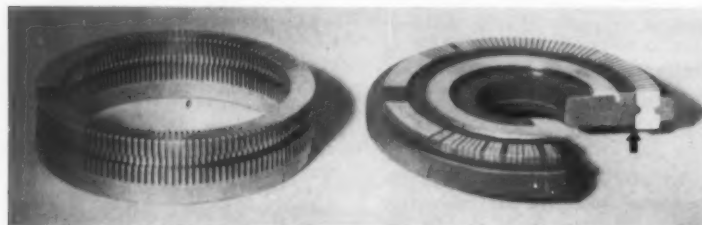


FIG. 31: Commutator molding shows how segments are displaced in resisting flow of high glass premix compound. Note also how shrink of compound leaves segments unsupported on hub of molding, see arrow. (Segments are made by milling solid ring as seen in view at left. Solid portion of the ring is cut away after molding.)

functional insert very casually supported on the plastic molding that is supposed to be gripping it. Large inserts of this kind can be designed with a reverse draft on the sides, which will allow the plastic mass to shrink as it cures, and this very shrinkage tightens the grip of the plastic on the convex sides of the insert so that the lack of support on the concave face of the insert becomes unimportant. Figure 34, p. 116, shows how this principle works in a part of this kind.

Non-reinforced plastics of the hard thermosetting class would not tolerate this kind of treatment, since a tight enough wedging action to securely hold the insert would be likely to crack apart the molding. Furthermore, with a condensation polymer such as phenolic, this hazard increases with time, due to the tendency of the material to continue shrinking slightly for some months after molding.

A further step in the relief of this shrinking problem can sometimes be achieved through differential temperatures in the mold and inserts.

If the inserts are preheated to a temperature 10 to 25° F. above the mold, the natural thermal shrinkage of the inserts as they cool down will help minimize the effects of the curing shrinkage. Further, if the outer mold surface is held at a temperature 10 to 25° higher than center core pin temperature, the cure will get started on the outer surface first and thus help to create a self-supporting outer plastic shell around the inserts—before the main central portion cures. This shell induces the still soft inner

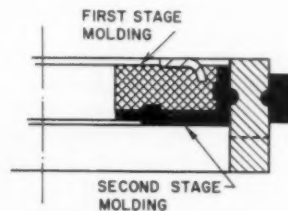
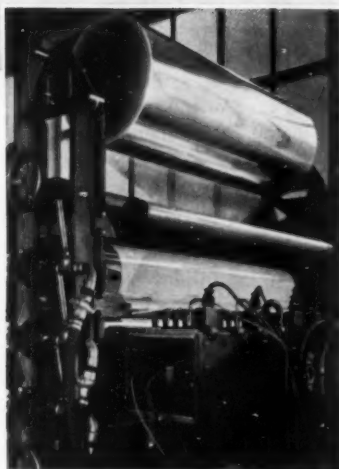


FIG. 32: Two-stage molding operation permits use of low glass premix in outer molding and involves little material inside large ring insert, thus eliminating both problems illustrated in Fig. 31.



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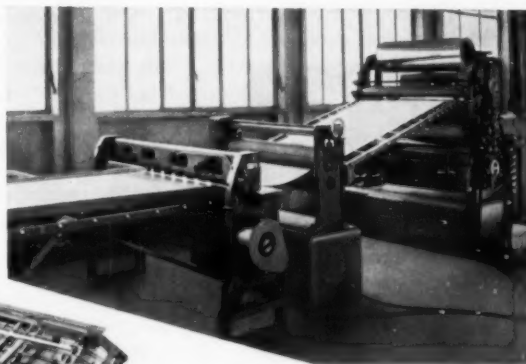


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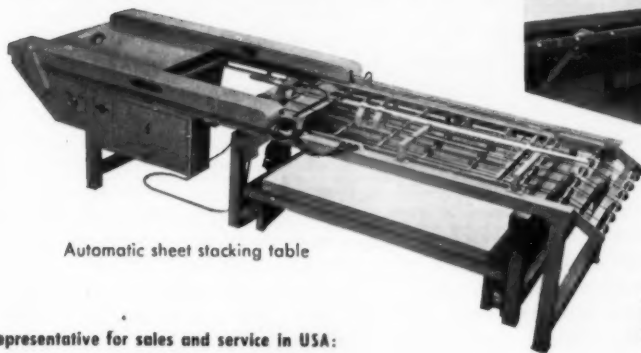
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FIG. 33: Single ring collector molding shows shrinkage void along curved undersurface of insert.



FIG. 34: Wedge-shaped inserts provide side-gripping action, which securely holds these rings, even though plastic has shrunk away from inner cylindrical surface of metal rings during cure.

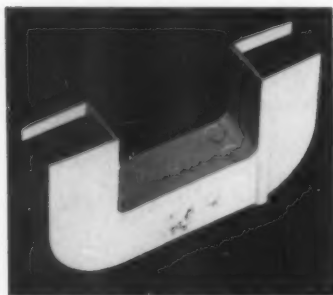


FIG. 35: Extra large pins are used to avoid cracking on ejection, which frequently occurs around smaller pins on thin wall parts of this kind. Note also the dirt smudges on the side of this part. These markings, which are the result of dirt in the compound itself, are characteristic of unpigmented premix materials.

portion to relax outward toward it as the cure progresses. This theory is supported by the fact that the above parts, when cured in this manner, end up with a larger bore diameter than when the mold is held at a uniform temperature.

Thin-wall problems

Many people who have been active in the field of molding glass-reinforced compounds regard them as suitable only for parts of fairly heavy wall section. In a sense this may be true, but thin-wall sections do not mean trouble *per se*. Let's examine this bugaboo.

First, recognize that any ordinary premix compound will normally fill out easy-to-mold sections of $\frac{1}{16}$ -in. thickness or less without difficulty. The difficulties begin to arise when the shape of the part becomes complex or the areas involved are large.

Intricate shapes may not fill out completely or may be damaged in removal from the mold. Large areas are likely to be warped or wavy, and the part surfaces may stick badly to the mold surfaces. Compounds with any tendency to segregate will show this characteristic with especial severity in intricate thin-wall parts, and variations in flow characteristics, as will be discussed later in the "poor fill" section of Part 4, become highly critical.

The coil form seen in Fig. 35, left, presents a good example of thin-wall troubles. Elaborate cooling fixtures are necessary with this part to reduce warping, and even so the parts are not very true as seen in Fig. 26, p. 110. In addition, special precautions are needed in order to prevent the ejector pins from cracking the parts when they are pushed off the force.

Extra-large pins are used as can be seen from the pin marks in Fig. 35; a high-hot-strength compound formulation is used to assist in this problem, which unfortunately means the use of highly reactive resins that make for increased warp problems; and a long cure cycle is used to insure complete cure of the compound before removal, in this case $1\frac{1}{2}$ min. on a part which other-

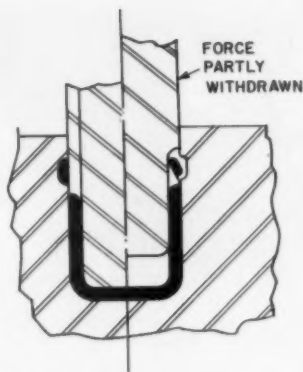


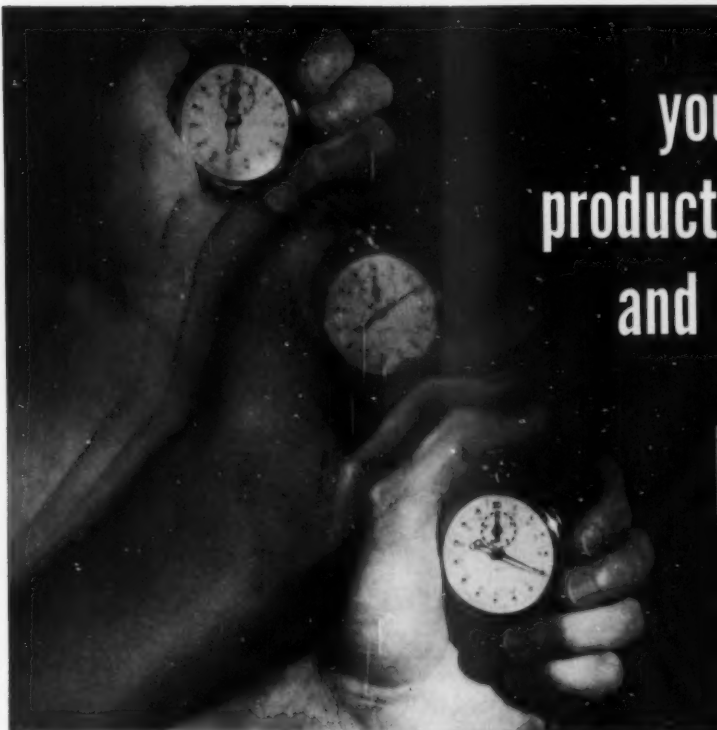
FIG. 36: Premix parts may be purposely held on either force or cavity by the device of reverse tab with flash connection, whose effectiveness depends on the characteristically high compressive strength of even very thin flash in premix materials.

wise could easily be removed after less than 1 minute.

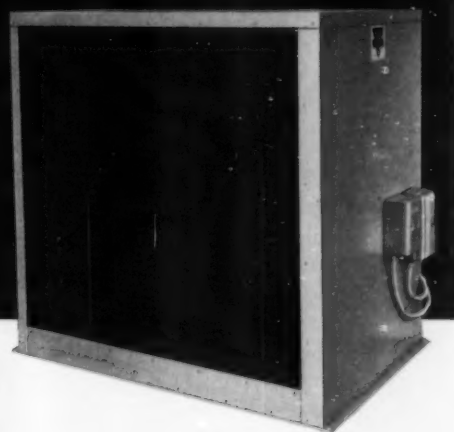
Another device which is very helpful in stripping thin-wall parts, and others, from the mold force without damage is illustrated in Fig. 36, above. This consists of having a small extra cavity in the flash area of the mold, which forms a tab that is connected to the principal piece by a thin web of flash. The left half of Fig. 36 shows the half-mold in the closed position. As the force is withdrawn, the little tab, acting through the flash strip, holds the molding in the cavity. After the force has passed the tab (right side of Fig. 36), it falls easily out of its cavity and the part can be lifted out of the mold.

Since hot mold surfaces release better, and slow-curing resins release poorly, thin-wall parts should be run on fast cycles, and fast-closing presses are essential. Compositions for thin-wall applications must have low resin content to avoid segregation and yet have well integrated filler to avoid sticking from the heavy wiping action on the compound. Accurate mold surfaces are important, since there is almost no shrinkage to help release such parts from the mold.

Next, and final, installment: poor fill, deflashing, small parts, special properties, and mold maintenance.



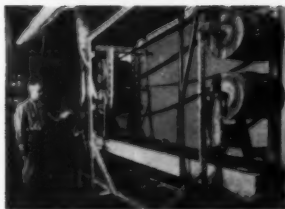
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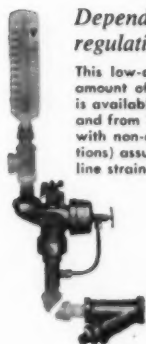


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This low-cost unit cuts water costs by supplying only the exact amount of water required for your particular application. Valve is available in two temperature ranges: adjustable from 60°-120°, and from 100°-160°—accurate to within 2°. Constructed throughout with non-corrosive materials—simple design (no electrical connections) assures dependable, trouble-free operation. Valve, including line strainer and thermometer, costs less than \$40.



Completely self-contained, Vic chillers are low in cost, inexpensive to operate, and easy to install—and the average unit requires only 15 sq. ft. of floor space. Available in five sizes up to 10 ton to meet most cooling requirements, and units may be easily adapted or modified to meet your special requirements.

WRITE TODAY for complete information on Vic air or water cooled chillers—also detailed case history reports on Vic chiller installations.

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This is Thermokup*—a throw-away plastic cup that insulates like a vacuum bottle, yet is only 1/10 of an inch thick. Because this cup is made of DYLITE, hot beverages stay hot and cold beverages stay cold longer. More important, you can hold Thermokup comfortably in your hand with almost no sensation of heat or cold. DYLITE is also used widely in the refrigeration and air conditioning fields, because it has superior moldability, a low rate of water vapor transmission, and possesses a K Factor of 0.242 at 2 lbs./cu. ft. density and a 75°F. mean temperature.

Thermokup Molded by:
Mid-West Pak Corporation, Belvidere, Illinois
Crown Plastic Cup Company, Fort Worth, Texas
Polychemical Industrial Ltd., Edmonton, Alberta, Canada
Patents applied for by: Crown Machine & Tool Company,
Fort Worth, Texas
*Trademark of Crown Machine & Tool Company, Fort
Worth, Texas



STRONG, DYLITE-MOLDED CHAIR FORMS FOR THE FURNITURE INDUSTRY

Molded DYLITE plastic forms are now being used as the basic structure for this modern-styled Futorian Chair. It is one of the newest innovations in upholstered furniture. Why? Because the entire frame is molded-to-shape in a single operation. The chair itself weighs between 25 and 30 pounds; a similar chair with a wood frame would weigh more than 80 pounds.

Here are some of the reasons why DYLITE was chosen: DYLITE is stronger than wood; it is more economical to use; it is 66% lighter than the material previously used; it is shock-absorbent and warp-resistant. More important, it gives the designer additional creative freedom, and allows him to design shapes and sizes that were previously impractical. Because DYLITE is dimensionally consistent, there is no variation from frame to frame—all covers can be pre-cut and pre-sewn.

Chair manufactured by: Futorian-Stratford Furniture Co., Chicago, Illinois

LIKE TO LEARN MORE ABOUT DYLITE?

If you'd like to get more information about DYLITE expandable polystyrene, and how it may help to solve one of your problems, write now to Koppers Company, Inc., Plastics Division, Dept. MP-79, Pittsburgh 19, Pennsylvania. We'll be glad to answer your questions, and offer technical assistance.

MAKE NEWS IN FOUR MAJOR INDUSTRIES

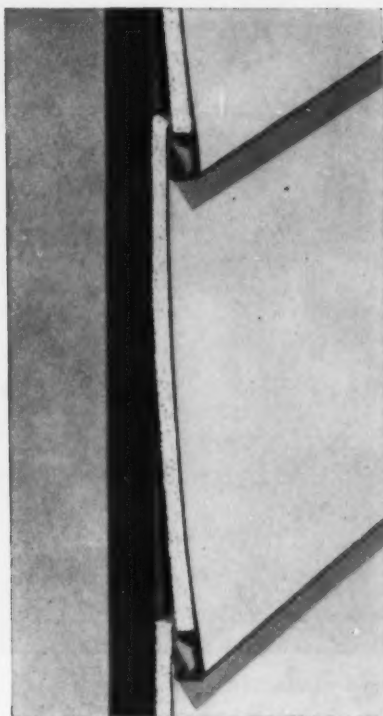


**SHOCK-ABSORBENT DYLITE COCOON
FOR THE PACKAGING INDUSTRY**

Normally, it takes time to prepare a typewriter for shipment! At Royal McBee Corporation, this job used to require heavy slabs of cardboard and yards of tape, cord and wire—and lots of expensive time preparing each machine for shipment. But, now Royal Electric Typewriters are packed and shipped in 3½-pound DYLITE foam cocoons.

This new DYLITE pack offers shock-resistant protection, thanks to two characteristics: shock absorbency and moldability. DYLITE molds to fit the intricate contours of odd-shaped products, such as typewriters, thus holding movable parts firmly in place. The new DYLITE pack cuts shipping costs since it weighs only one-third as much as the old container; and its simplified design has reduced handling time four and a half minutes. DYLITE's unique combination of properties makes it highly suitable for industrial or consumer-type packages.

Cocoon package molded by: Worcester Moulded Plastics, Worcester, Massachusetts



**LIGHTWEIGHT DYLITE-BACKED
ALUMINUM SIDING FOR
THE BUILDING INDUSTRY**

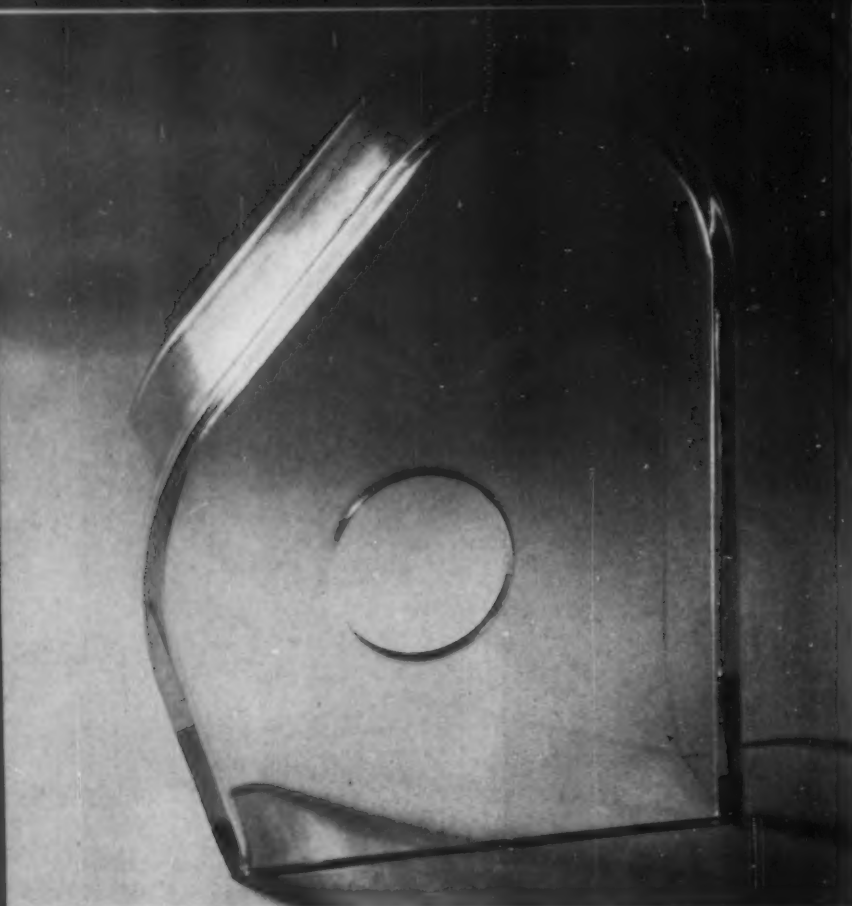
Because it has a bonded DYLITE backing, three-eighths of an inch thick, this colorful aluminum lap siding has three times the insulation of wood. Since DYLITE is lightweight, it is a simple task for one man to install these aluminum panels. Moreover, DYLITE is strong, low cost and water-resistant. It will not warp or rot. It is safe from vermin and mildew damage. These aluminum panels meet F.H.A. Specifications. DYLITE also has proved to be an outstanding vapor barrier around perimeters and slabs and in crawl spaces.

Aluminum Siding by: ALSCO, Inc., Akron, Ohio

Offices in Principal Cities • In Canada: Dominion Anilines and Chemicals Ltd., Toronto, Ontario

KOPPERS PLASTICS

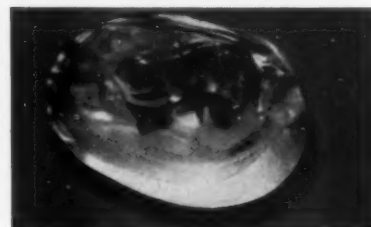




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No vacuum or special equipment is necessary for easy production of durable, weather-resistant Maraglas castings in any size or shape.



Water-clear Maraglas has 90% light transmission. Castings are bubble-free. (Embedment by Miracle Plastic Mfg. Co., New York City).

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Plastic tooling time and labor costs are reduced by use in many industries of Marblette's epoxy casting and laminating resins.

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Polyvinyl fluoride film

By Verne L. Simril[†] and Barbara A. Curry[†]

Teslar¹ polyvinyl fluoride (PVF) film is the first flexible plastic film available in the lower price range to offer inherent weatherability, coupled with outstanding chemical resistance and toughness. A result of Du Pont research into fluorine chemistry begun in the early 1940's, Teslar is the direct descendant of research samples that remained clear and tough for more than 10 yr. exposure in Florida. Its outdoor durability, inertness, and toughness are a consequence of its chemical structure and do not depend upon the inclusion of stabilizers, light absorbers, or plasticizers.

The properties of PVF film mentioned above, combined with its fabricability and unique electrical properties, make it an outstanding candidate for a broad range of outdoor and industrial applications, including protective surfacing of a wide range of flexible and rigid materials, packaging of greasy and corrosive materials, electrical insulation, and flexible glazing. Many of these are new and largely untried applications for flexible films. Therefore, along with the development of Teslar PVF film itself, it has been necessary to develop techniques

for using it in a variety of fields and to develop procedures for evaluating its contribution in each application. This work has been in progress for over 3 yr. and is continuing.

To study the field of glazing, greenhouses and poultry house windows in all parts of the country have been covered with PVF film for periods up to 3 to 4 yr., and its performance compared to other materials. In the field of protective surfacing, techniques have been worked out for preparing and testing laminates of film to many different kinds of sheet materials. These laminates are being tested on exposure racks in Florida, Arizona, and New York, as panels and complete walls on a number of buildings, and in several different kinds of accelerated tests in the laboratory. The properties of PVF film and some of



FIG. 1: Wood frame greenhouse in Lexington, Ky., covered with Teslar PVF film in October, 1955, is shown after 39 months operation. It is still in good condition.

its promising applications are reviewed briefly in the following paragraphs.

Outdoor weathering

PVF film exposed in Florida on test racks facing south at an angle of 45° to the horizontal

Table I: Outdoor weathering life of films

Film	Thickness	Life ^a in Florida test
	mils	yr.
Teslar PVF	2	7+
Mylar ^b W	5	4
Mylar A	5	1/4
Copolyester laminating film	3	c
PVC (unplasticized)	5	1/2
Low-density polyethylene	4	1/4
Cellulose acetate butyrate	5	1/2

* Reg. U. S. Pat. Off.
† Research Division, Film Department, E. I. du Pont de Nemours & Co.

¹ Du Pont's trademark. This film formerly was known as Type R polyvinyl fluoride film. Teslar PVF film is now available in sizable quantities from semi-works production. Information as to its availability, properties, and applications can be furnished by Sales Development and Technical Service Section, Film Department, Du Pont Co., Wilmington, Del.

^a Life values are the number of years exposure required to decrease film elongation to 10 percent. Exposure samples were mounted unsupported (attached at edges only) on test racks facing south at 45° to the vertical.

^b Du Pont trademark for polyester film.

^c This film's elongation is only 4% before weathering.



FIG. 2: Laboratory laminating operation for film surfacing of rigid substrates.

does not change in appearance. Film strength properties decrease slowly in a regular fashion. It has been shown by severely accelerated laboratory weathering tests that the logarithm of the tensile elongation at break of PVF film is a linear function of time in the accelerated weathering test. Results obtained on samples of unsupported film weathering 3 yr. in Florida indicate that in natural

weathering the logarithm of the elongation at break is also a linear function of time. Extrapolation of the natural weathering data beyond 3 yr. indicates that elongation at break of PVF film will decrease from over 100% at zero time to 10% at about 7 yr. and to 1% at 14 years. The level of elongation at break corresponding to film failure clearly depends upon the use to which the film is

put. PVF film is still flexible and tough when its residual elongation has fallen to 10 percent. For example, tensile strength remains at better than 50% of its original value, and bursting strength remains at about 25% of its original value when the elongation at break has decreased to 10 percent. Most presently used surfacing materials, paints, enamels, lacquers, etc. have less than 10% elongation before aging. It is well to note here that Florida exposure is much more severe than the average for the United States, and that films exposed at an angle of 45° to the horizontal and facing south are more rapidly degraded than films facing other directions or mounted at other angles. Therefore, it is probably safe to predict that films in average outdoor use in the United States will maintain their properties 2 to 4 times longer than film exposed at 45° to the horizontal and facing south in Florida.

The durability of PVF film outdoors in Florida is compared to that of other types of transparent, flexible films in Table I, p. 121;

Table II: Strength properties of films at 25° C.

Property	Teslar PVF (Type 30)	Mylar A	Copolyester laminating film	Unplasticized PVC	Poly-density	Cellulose acetate butyrate
Thickness, mils	1.5	2.0	3.0	2.4	2.0	2
Tensile strength, p.s.i.	13,000	24,000	9,000	8,000	2,000	7,000
Elongation, %	150	150	3	100	500	100
Tensile modulus, p.s.i.	320,000	600,000	400,000	350,000	40,000	200,000
Impact strength, kg.-cm./mil	5	6	0.1	1	1.5	3
Mullen burst strength, p.s.i./mil	30	50	12	20	—	25
Flex life, cycles	70,000	11,000	1	1,300	30,000-40,000	130

Table III: Properties of films at various temperatures

Property	Teslar PVF (Type 30)	Mylar A	Polyethylene, medium-density	Unplasticized PVC	Copolyester laminating film
Zero strength temp., °C.	300	248	110	170	136
Flex life, 25° C., cycles	70,000	11,000	30,000-40,000	1,300	1
Flex life, -17° C., cycles	40,000	5,000	—	—	1
Tensile strength, 25° C., p.s.i.	13,000	24,000	2,000	8,000	9,000
Tensile strength, 100° C., p.s.i.	6,000	18,000	500	1,000	—
Elongation, 25° C., %	150	150	500	100	—
Elongation, 100° C., %	165	160	High	400	—
Shrinkage, 100° C., %	Negligible	<1	High	10	>2
Shrinkage, 150° C., %	1	<5	Melts	—	Melts

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the Florida life (to 10% residual elongation) of 2-mil Teslar is about twice that of 5-mil Mylar polyester film Type W, the next most durable film listed. It should be noted that the Florida life of 2-mil Teslar would be about four times that of 2-mil Mylar W.

Strength properties

PVF film is strong, flexible, and fatigue resistant. These qualities are shown in Table II, p. 122, and compared to the properties of other films. It is especially noteworthy that it withstands flexing much better even than medium-density polyethylene and, with the exception of low-density polyethylene, far better than any other commercially available unplasticized film.

PVF film retains its toughness and flexibility over a wide range of temperature (Table III, p. 122). It can be creased sharply at

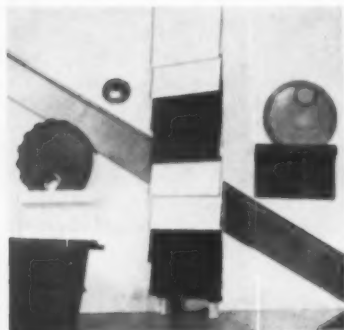


FIG. 3: Steel and aluminum laminates surfaced with Teslar PVF film. These objects were shaped by applying conventional metal stamping, brake forming, and roll forming operations to flat panels surfaced with film.

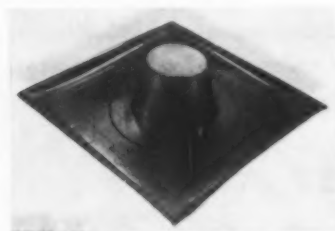


FIG. 4: Formed laminate of PVC sheet surfaced with PVF film and embossed by hot pressing with a wire screen prior to vacuum forming. Note depth of draw and sharpness of definition.



FIG. 5: Plant gatehouse covered with hardboard siding surfaced with Teslar PVF film. Erected August, 1957.

—180° C. without cracking and it is extremely resistant to flexural fatigue at —17° C. Its zero strength temperature is about 300° C. Its strength decreases with increasing temperatures, but slowly, so that it remains quite strong at 100° C. and higher. At 150° C. it is stronger (tensile strength equals 3000 p.s.i.) than polyethylene is at room temperature. It is dimensionally stable, shrinking less than 1% at 150° C., and only 2 to 3% at 170° C. Its resistance to thermal degradation is remarkable, as illustrated by the data in Table IV, right.

Protective properties

PVF film provides excellent protection because it is inert, has low permeability to most gases and vapors, and resists staining and abrasion. These characteristics are compared to those of other films and surfacing materials in Tables V to VIII.

PVF film retains its film form and strength when boiled in strong acids and bases (Table V, below). It is essentially unaffected by hydrocarbons and halogenated solvents at all temperatures, and is only partially soluble in a few polar solvents at temperatures of 150° C. and higher. It is also highly resistant to the effects of hydrolysis and its resistance to fungal attack is such that no change in appearance or strength has resulted from 5-yr. burial.

Its permeability to gases is low, being about the same as that of Mylar polyester film (Table VI, p. 125). Water vapor diffuses through PVF film about one-third to one-half as fast as through typical "impermeable" paints, slightly faster than through Mylar and twice as fast as through polyethylene (Table VII, p. 125). It

Table IV: Film life at 150° C.

Film	Time to embrittle- ment hr.
Teslar	3,000
Mylar A	700-1500
Rigid PVC	100-500
Cellulose acetate butyrate	200
Trifluorochloroethylene polymer	1,500
Teflon FEP fluorocarbon film	4,000+

Table V: Chemical resistance of films^a

Chemical	Teslar	Mylar A	Copolyester laminating film	Polyethylene, low-density
10% HCl				
1 wk. at 25° C.	1	1	1	1
2 hr. at boil	1 ^b	1 ^b	1 ^b	1
10% NaOH				
1 wk. at 25° C.	1	1	1	1
2 hr. at boil	1	3	3	—
Carbon tetrachloride				
1 wk. at 25° C.	1	1	1	1
2 hr. at boil	1	1	2	3
Acetone				
1 wk. at 25° C.	1	1	2	1
2 hr. at boil	1	1	2	1
Benzene				
1 wk. at 25° C.	1	1	2	1
2 hr. at boil	1	1	2	3
Methyl ethyl ketone				
1 wk. at 25° C.	1	1	2	1
2 hr. at boil	1	1	2	1

^a Code used in table for chemical resistance: 1) No change in physical properties; 2) Strongly swells—partial solution; 3) Dissolves.

^b At longer times, polyesters degrade and dissolve in HCl; Teslar does not.

Table VI: Permeability of films to gases

Film	Permeability (g./100 m. ² /hr./mil at 23.5° C. and 0% R.H.)		
	O ₂	N ₂	CO ₂
Teslar	0.3	0.02	1.4
Mylar A	0.35	0.04	1.8
Low-density polyethylene	18.0	2.4	97.0
Plasticized PVC	7.0	1.0	40.0

Table VII: Permeability of films to vapors

Chemical	Permeability (g./100 m. ² /hr./mil at 35° C.)			
	Teslar	Mylar A	Polyethylene, low-density	Copolyester laminating film
Ethanol	35	1	—	350
Ethyl acetate	1,000	55	9,500	Attacks film
Carbon tetrachloride	50	50	55,000	Attacks film
Hexane	55	16	37,000	8,000
Benzene	90	18	36,000	Attacks film
Acetone	20,000	350	4,000	Attacks film
Acetic acid	45	3	—	Attacks film
Water (39.5° C.)	180	160	100	140

has low permeability to organic vapors with the exception of ketones and esters.

PVF film presents an easily cleanable, stain-resistant surface. Dirt, collecting on samples exposed outdoors in an industrial atmosphere, washes off much more easily and completely than from similarly exposed paint panels. The film surface does not chalk, craze, or erode appreciably on long exposure outdoors. Despite these evidences of surface inertness, common varieties of house paints adhere well to Teslar, whether applied before or after it has been aged.

The toughness and protective quality of PVF film are exemplified also by its resistance to abrasion as illustrated in Table VIII, right. For equivalent thickness, it is 4 to 10 times as resistant to abrasion as typical hard-surface lacquers and enamels.

Electrical properties

The electrical properties of PVF film are compared to those of other films in Table IX, right. In addition to an unusually high dielectric constant, PVF film offers high dielectric strength and outstanding resistance to thermal degradation and the effects of

hydrolysis. This unique combination of properties suggests possible high levels of performance in d.c. capacitors, as a curing wrap in wire and cable manufacture, and as insulation in hermetically sealed electrical systems. Tests are now under way in these areas.

The properties of PVF film recommend it for many uses and particularly for all those uses in which outdoor durability is of prime importance. An extensive program of application research and evaluation has been in progress for more than 3 years. The objectives of this research have been to develop methods and systems for using Teslar polyvinyl fluoride film to best advantage in a variety of applications and to determine its utility in those applications.

Glazing is a logical application for a tough, transparent, weatherable film. In the field of plastic greenhouse coverings, PVF film is a standout. There are now more than a dozen operating greenhouses glazed with PVF film scattered over the country (see Fig. 1, p. 121). They have been installed for periods up to 4 yr., and the film properties are holding up as well as, or better than, predicted by natural and accelerated aging tests. Farm building and poultry house glazing, cold frame covers, crop covers, and similar agricultural uses are other areas in which unsupported PVF film has proven to have the right combination of transparency and durability. It is also transparent to es-

(To page 168)

Table VIII: Abrasion resistance^a of surfaces of films and finishes

Surface	Substrate	Time to wear through min./mil
Teslar PVF film	Steel	4-6
	Wood	3-5
Mylar polyester film, Type A	Steel	4-6
	Wood	3-5
Copolyester laminated film	Steel	3-4
Acrylic lacquer	Steel	1/2-1
Automobile baking enamel	Steel	1/2-1
Appliance enamel	Steel	1/2-1

^a Bell Abrader, A.S.T.M. D 658-44.

Table IX: Electrical properties of films at 25° C.

	Mylar C	Teslar	Teflon FEP	Low-density PE
Dielectric constant, 60 c.p.s.	3.2	7.5	2.0	2.25
Dissipation factor, 60 c.p.s.	0.003	0.005	<0.0002	0.0005
Dielectric strength, volts/mil	4500	3000	3000	4000
Volume resistivity at 130° C., ohm-cm.	10 ¹⁴	10 ¹⁰	>10 ¹⁸	—

Organosol formulations for stir-in dispersion-type PVC resins

By Arnold C. Werner*

The organosol technique conceived and introduced several years ago has now matured into major practical significance with the help of plastisol, stir-in type, PVC resin. This paper presents basic rules and considerations for the organosol formulator in a relatively new field where little published information is available.

Since organosols owe their basic reason for existence to rheological factors, this characteristic, its proper achievement and measurement, receive special emphasis. The effective use and application of diluents, wetting or surfactant agents, fusion conditions, etc., are treated in detail. The organosol formulator will find that skills developed in plastisol compounding are readily applied to this newer system.

For the past decade the PVC dispersion field has enjoyed a record of considerable expansion. From a relatively recent beginning, the great flexibility of PVC pastes has led to their trial and use in a wide variety of products. It has been estimated that about 70 to 80 million lb. of dispersion resin were sold during 1958 (1).¹ The ease of application provided by the 100% non-volatile plastisol is dependent upon the presence of sufficient plasticizer to render the dispersion fluid. The level of plasticizer is determined by the desired degree of flexibility or hardness in the fused product.

Since the plasticizer level is determined by the end-product requirement, it often happens that the resultant paste viscosity is not ideal for ready application. In this event adjustments are made with various formulating ingredients in order to develop the required rheological properties. A spray or cold-dip plastisol is a typical example. Here sufficient plasticizer is generally available in the formulation to provide a fluid paste. However, the need for low viscosity and high yield value required for proper application are met by

*Marvinol (PVC) Product Development and Sales Service Group, Naugatuck Chemical Div., U. S. Rubber Co.
¹Numbers in parentheses link to references at end of article, p. 173.

formulating adjustments made with high-oil-adsorptive fillers or gels, and volatile diluents.

On the other hand, the need for hardness or rigidity in a product may call for a reduction in the plasticizer level, below which a sufficiently fluid paste cannot be formed. Here adjustment with a small amount of volatile diluent is adequate to develop enough fluidity for application. Such formulations are generally referred to as modified plastisols, and are commonly used in fabric coating and rotational molding of rigid-type plastisols.

An organosol results when the plasticizer level has been reduced to a point where sufficient plasticizer is not present to form even a paste, and the use of volatile diluents to develop fluidity becomes mandatory.

The first definitive study of these systems developed formulating techniques for the vinyl grind-in type resin (copolymers of vinyl chloride and vinyl acetate). This study, covering a broad range of plasticizer levels, showed that it was essential to achieve a certain degree of polarity via polar diluents in the continuous phase of the system, the continuous phase being made up of plasticizer and volatile dil-

uents. When used in organosols, the copolymer resins required this relatively high level of polarity initially for deagglomeration, proper dispersion of the resin, the development of low initial viscosities and good viscosity stability; and, finally, for preventing resin settling with age. Judicious blends of volatile ketones and aromatic and aliphatic hydrocarbons were instrumental in achieving this end (2-4).

With the advent of the stir-in PVC plastisol resins, the organosol formulating concepts previously developed for the copolymer, grind-in resins were

Test recipe (See Table I, p. 130)

Dispersion resin	100
DOP plasticizer	30
G-62 plasticizer	5
12V6 stabilizer	2
19V1 stabilizer	1
PEG400MO wetting agent	1.5
Dispersol diluent	15

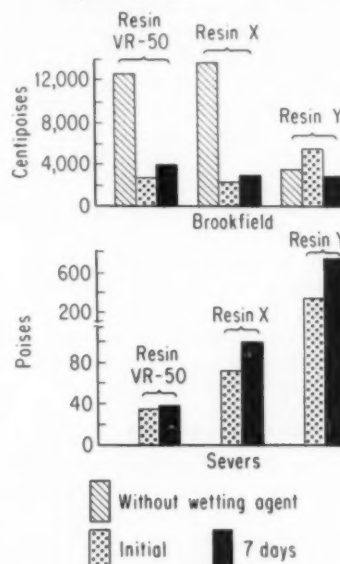
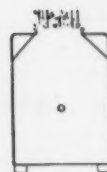


FIG. 1: Brookfield and Severs evaluation of dispersion resins in organosol recipe.



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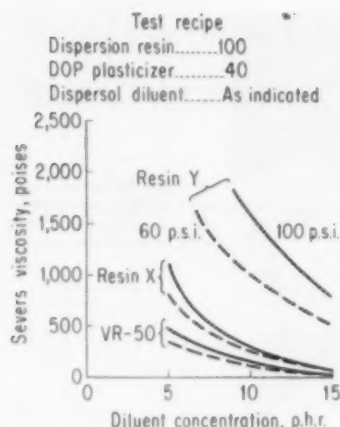


FIG. 2: Severs evaluation of dispersion resins at various diluent concentrations.

often applied to the new paste resins.

Considerable research has been directed in our laboratory toward gaining a better understanding of the technology involved in dispersion coating (5, 6). As interest mounted in the use of the organosol technique, efforts were aimed toward developing the formulating principles involved in this type of application, using the stir-in-type, dispersion grade PVC (Marvinol) resins.

Organosol formulation

The first consideration in formulating an organosol is the selection of dispersion resin. This selection is important with regard to such properties as viscosity at high and low shear, viscosity stability, heat stability, clarity, gloss, etc. As will be shown, plastisol resins available yield a variety of results with respect to many of these properties.

Of equal significance is the selection of the plasticizer or blends of plasticizers and their concentration. The plasticizer level is primarily determined by the hardness or strength required in the fused product. Such properties as cold temperature flexibility, migration, and flame resistance will also influence the selection of the plasticizer used. Other considerations, such as viscosity stability, may preclude the use of certain plasticizers that would otherwise be satisfactory.

The stabilizer system used

should be adequate for its primary function, heat stability. A liquid, barium, cadmium, zinc, chelator system probably contains the best balance of properties. As in plastisol work, such systems containing zinc should always be

balanced with a small amount of epoxy plasticizer to prevent sudden blackening of the compound during baking.

Up to this point the formulating principles applied are no different than those used for most

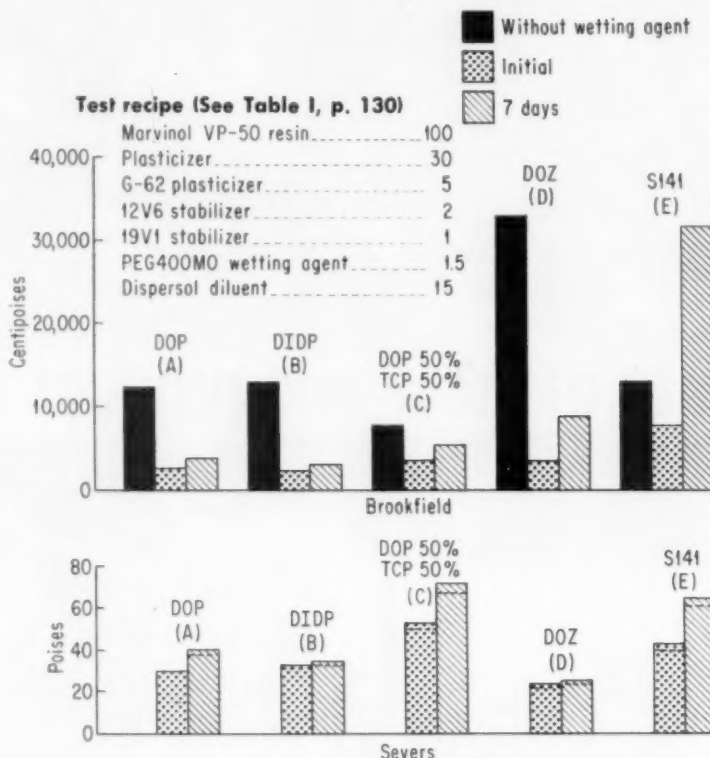


FIG. 3: Brookfield and Severs evaluation of various plasticizers in an organosol recipe.

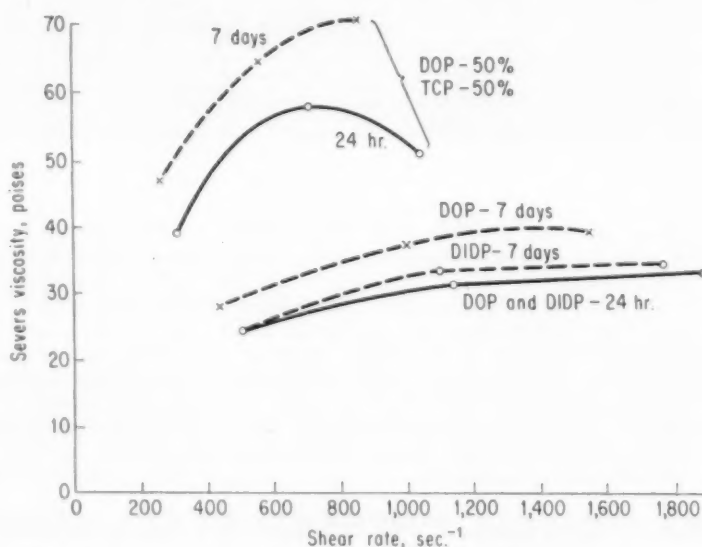


FIG. 4: Rheogram of organosols with various plasticizers. Formulations correspond to A, B, and C in Fig. 3.

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plastisol applications. The additional ingredient required, the volatile diluent, is necessary to render the organosol sufficiently fluid for compounding and subse-

quent application. Its influence on viscosity and storage properties are of prime importance. Its boiling range is to be considered in connection with the type of fusion

Table I: Identification of materials used in test recipes

Trade name	Type	Supplier
PVC resin		
Marvinol VR-50	Plastisol-organosol	Naugatuck Chemical
Plasticizers		
Drapex 4.4	Epoxy stearate	Argus Chemical
G62	Epoxidized soybean ester	Rohm & Haas
Admex 711	Epoxidized soybean ester	A.D.M.
DOZ	Di-2-ethylhexylazelaate	—
SI41	Alkyl-aryl phosphate	Monsanto
DOP	Di-2-ethylhexyl phthalate	—
DIDP	Diisodecyl phthalate	—
TCP	Tricresyl phosphate	—
Stabilizers		
12V63	Liquid barium, cadmium, zinc	Harshaw
12V6	Liquid barium, cadmium, zinc	Harshaw
19V1	Liquid barium, zinc	Harshaw
Flomax	Liquid barium, cadmium	National Lead
Nalzin	Liquid zinc	National Lead
Mark M	Liquid barium, cadmium	Argus Chemical
Mark PL	Liquid zinc	Argus Chemical
Ferro 1720	Liquid barium, cadmium, zinc	Ferro
Wetting agent		
PEG400MO	Polyethylene glycol 400 monooleate	—

FIG. 6: Brookfield and Severs evaluation of organosol recipes with various wetting agents.

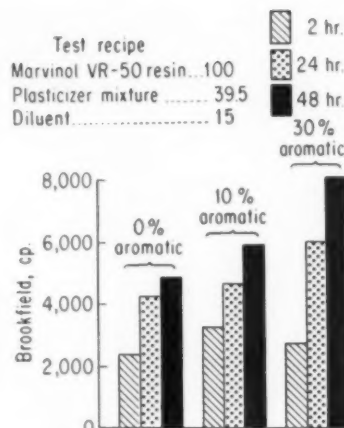
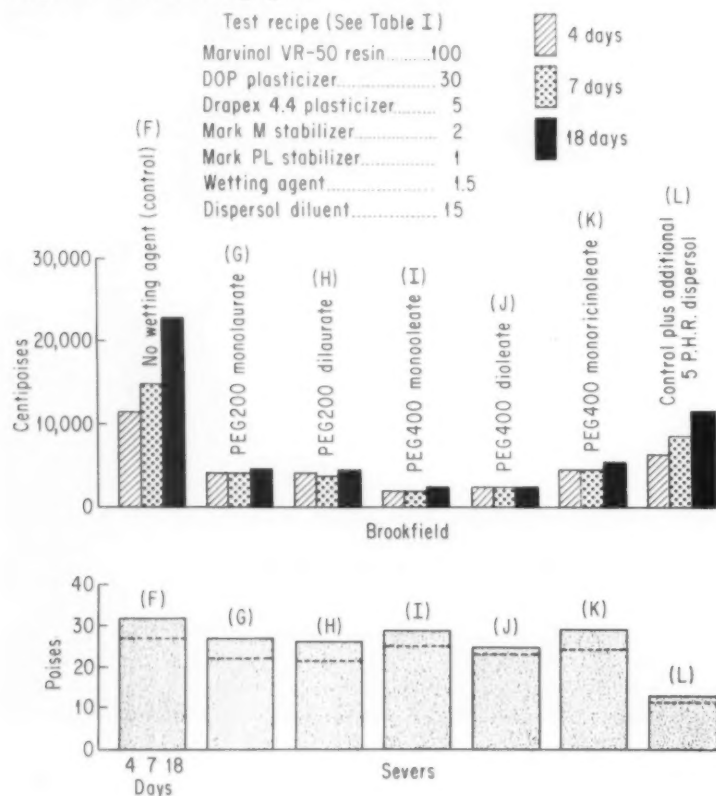


FIG. 5: Viscosity evaluation of an organosol prepared with diluents that have varying aromatic content.

equipment available. The diluent selected must be miscible with the other liquid ingredients in the formula, i.e., the diluent must not "kick out" any of the plasticizers or stabilizers.

In addition to volatile diluents, surface active agents may be found effective in lowering viscosities. The amount of wetting agent should be sufficient to achieve this but no higher, since many wetting agents have demonstrated a deleterious effect upon heat stability.

Dispersion resin

As a starting point for general organosol evaluations, the following recipe, based upon the previous discussion, was selected.

Dispersion resin	100
Primary plasticizer	30
Epoxy plasticizer	5
Stabilizer	3
Wetting agent	1.5
Aliphatic diluent	15

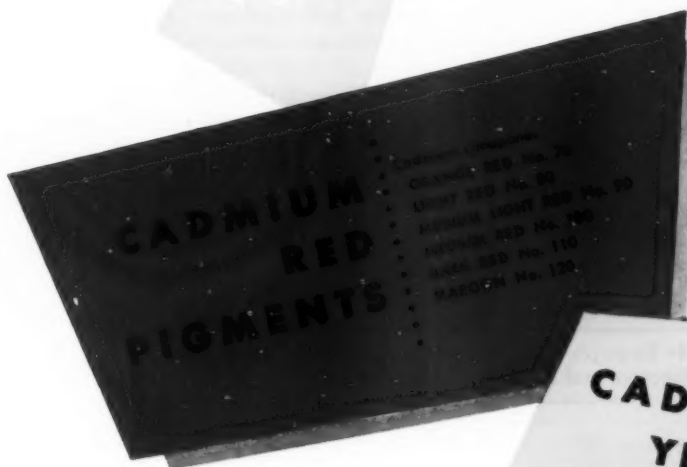
Figure 1, p. 126, gives viscosity data² on three competitive plastisol resins in this recipe, using DOP as the primary plasticizer. In the sample preparation only enough diluent was used to develop a sufficiently viscous paste for effective mixing, the balance being added slowly near the end of the mixing cycle. However, Resin Y, which required all its diluent for mixing, had Severs

²In this article the convention of expressing Brookfield viscosities in centipoises and Severs viscosities in poises has been used in order to readily distinguish between these determinations. One poise equals 100 centipoises.

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Table II: Prices and composition of volatile diluents

Volatile diluent	Price ¢/lb.	Composition
Ketones		
Methyl ethyl ketone (MEK)	0.16	$\text{CH}_3-\overset{\text{O}}{\underset{\text{ }}{\text{C}}}-\text{C}_2\text{H}_5$
Methyl isobutyl ketone (MIK)	0.18	$\text{CH}_3-\overset{\text{O}}{\underset{\text{ }}{\text{C}}}-\text{CH}_2\text{CH}(\text{CH}_3)_2$
Aromatic hydrocarbons		
Toluene	0.04	
Xylene	0.05	
Aliphatic naphthas (7)	Price ¢/lb.	% Aromatic % Naphthenes % Paraffins
VM&P naphtha ^a	0.03	9 40 51
Mineral spirits	0.03	18 22 60
Shell 140 ^b	0.04	0 31 68
Dispersol ^b	0.04	0 26 74

^aComposition may vary with manufacturer.

^bMaterial currently supplied with composition different from above.

viscosities many times that of the other two resins checked. Even though this sample had an exceptionally low Brookfield viscosity without the addition of wetting agent, its high Severs viscosity would preclude its use in many applications.

In the case of Resins VR-50 and X, a tremendous reduction in low-shear (Brookfield) viscosity resulted from the use of the wetting agent. A more detailed study of the use of these materials is covered in a later section of this discussion.

The high-shear (Severs) viscosity of an organosol is reduced considerably by the use of additional diluent. Figure 2, p. 128, shows the high-shear response to varying amounts of diluent for Resins VR-50, X, and Y. If there is substantial diluent evaporation just prior to the high-shear coating of an organosol, the rapid increase in Severs viscosities at reduced diluent levels indicates how critical a coating operation may become.

Plasticizers

Brookfield viscosity data with various plasticizers, before and after the addition of wetting agent, are shown in Fig. 3, p. 128. Again, the tremendous effect of the wetting agent on Brookfield viscosities is noted. Regardless of

the increase in Brookfield viscosity of Recipes A through D after a week's aging, all are well below the initial value without wetting agent.

The poor Brookfield viscosity stability of Recipe E containing Santicizer 141 has normally been associated with this plasticizer due to its high solvating effect in plastisol work. However, the initial viscosities do not appear to be so high as to preclude its use.

Severs data show some differences in viscosity from plasticizer

to plasticizer. At a diluent level of 15 P.H.R. (parts per 100 parts of resin) most of these formulations appear to be sufficiently low in Severs viscosity for most high-shear applications.

A plot of viscosity versus shear rate (Fig. 4, p. 128) illustrates the high-shear flow properties of three organosols based upon some common primary plasticizers.

Volatile diluents

Volatile solvents and diluents, such as ketones and aromatic and aliphatic hydrocarbons, have been commonly used in vinyl solution and dispersion work. The ketones are good solvents for the solution grade of vinyls, and have a strong solvating effect on dispersion-grade PVC resins. Consequently, in organosols, their use as the sole diluent would result in high viscosity and poor viscosity stability. The aromatic hydrocarbons, although non-solvents for PVC, have a partial solvating or swelling effect on dispersion resin intermediate to that of the ketones and aliphatics. Both the ketones and aromatics are available in practically pure form. Chemical structure and representative prices are shown in Table II, above.

Aliphatic hydrocarbons, commonly known as petroleum naphthas in the paint field, are actually mixtures of paraffins, naphthenes, and aromatics. These materials

Table III: Example of modification of an organosol to obtain desired viscosity and coating characteristics

Test recipe	Recipe V	Recipe VI	Recipe V2
Marvinol VR-50 PVC resin	100	100	100
DOP plasticizer	20	20	20
Admex 711 plasticizer	5	5	5
Ferro 1720 stabilizer	3	3	3
Dispersol diluent	10	13	13
PEG400MO wetting agent	—	—	1.4
Temperature of organosol, °C.	29	30	30
Severs Viscosity			
100 p.s.i., poises	315	118	98
70 p.s.i., poises	276	112	93
40 p.s.i., poises	212	94	45
10 p.s.i., poises	102	52	45
Brookfield viscosity, spindle No. 3, 1 RPM, cp.	21,800	10,700	2,900
Film thickness, mils	4½	5	4½
Drag resistance	High	Low	Low
Flowout	Poor	Poor	Excellent

are available in a wide variety of boiling ranges and aromatic-aliphatic content. The aromatic, naphthene, and paraffin content of some representative naphthas are given in Table II. Those naphthas with no aromatics present are primarily made for use in odorless house paints and household insecticides and have been found to be well suited for organosol work. Their odorless quality results from the removal of their aromatic content and other odor-producing compounds.

Since 10% or more of an organosol recipe may be volatile diluent, the \$0.18/lb. price for MIK would make its use less attractive than the \$0.05/lb. aromatics, and \$0.03 to \$0.04/lb. aliphatic naphthas. The use of aliphatics, in addition to cost considerations, would also be more desirable, due to their lower odor and toxicity. Consequently, our development activity has revolved about the use of aliphatic diluents, even though this repre-

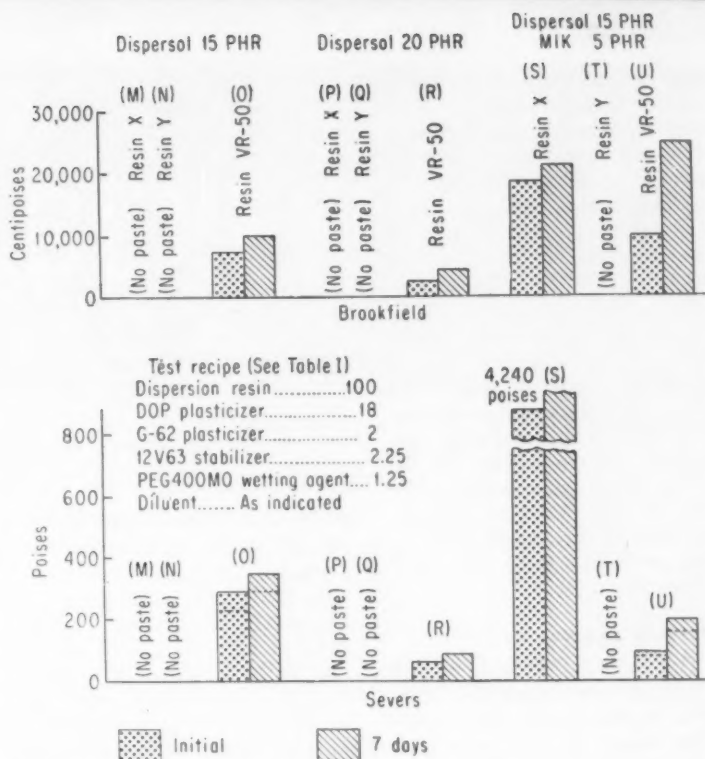


FIG. 7: Severs and Brookfield evaluation of low plasticizer level organosols.

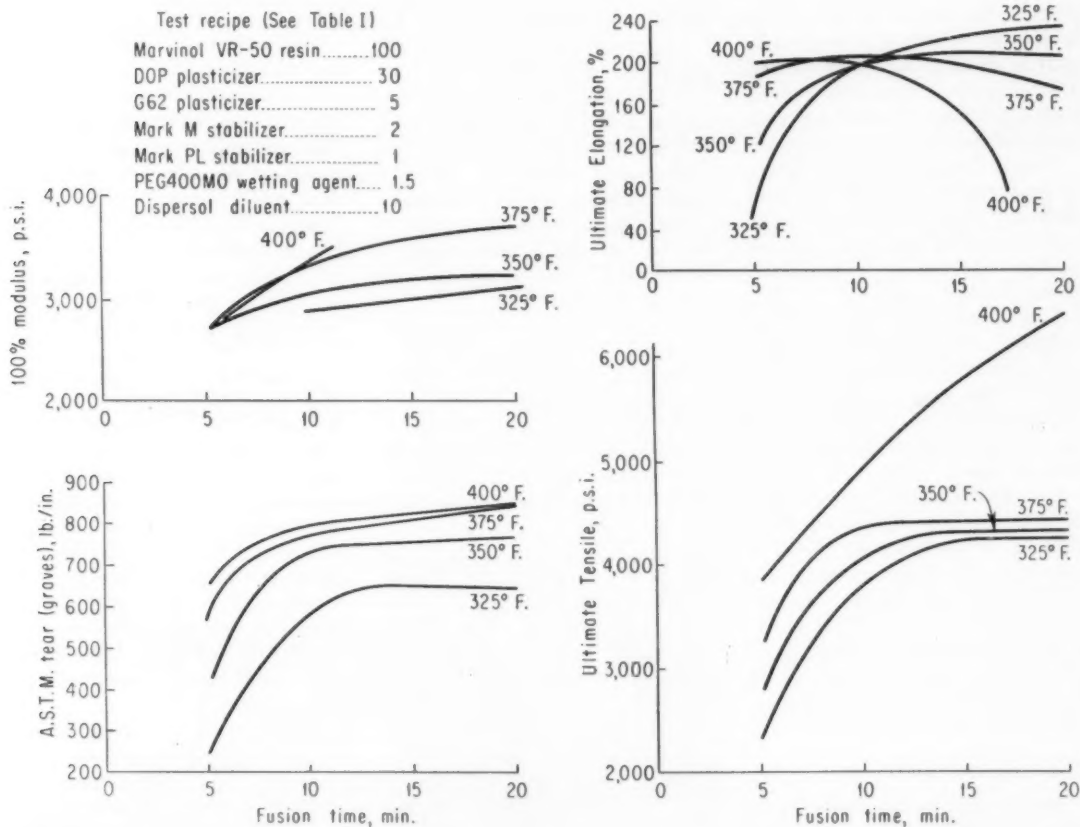


FIG. 8: Physical properties of organosol films versus fusion conditions.

sents a departure from the common use of more polar blends of ketones, aromatics, and aliphatics.

To investigate the effect of aromatic content on viscosity, a proprietary organosol recipe was prepared with varying blends of aromatic and aliphatics, up to 30% aromatic, by utilizing diluents of known composition. Figure 5, p. 130, illustrates clearly that, although the three diluent blends gave similar initial viscosities, the higher aromatic content resulted in noticeably increased viscosities after 48 hr. aging. These data indicate the need for selection of diluents on the basis of their composition as well as boiling range and other properties.

Wetting agents

The influence of polyethylene glycol 400 monooleate (PEG400-MO) on organosol viscosities has been amply demonstrated.

Formulations and data shown in Fig. 6, p. 130, graphically illustrate the effectiveness of several other wetting agents in the glycol ether series with various molecular weights and chain endings in both reducing low-shear (Brookfield) viscosities and maintaining good low-shear viscosity stability. Low low-shear viscosity, a measure of the ability of an organosol to level out once cast, is of particular importance in a film casting operation, where surface smoothness is important in the finished product.

It is interesting to note that the influence of these agents on high-shear (Severs) viscosity is negligible. This may be due to the exceptionally low Severs viscosity of the base recipe without wetting agent.

Five additional parts of diluent added to the base compound (Recipe L) further reduced the Severs viscosity. However, this additional diluent was not nearly as effective as 1% of wetting agent in reducing the Brookfield viscosity. At the level used, none of these materials had a significant effect on heat stability.

Low plasticizer levels

Some applications for organosols will require plasticizer levels considerably reduced from the 35

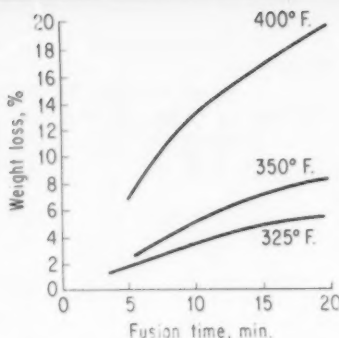


FIG. 9: Volatile loss from organosol film under various fusion conditions. All films pre-baked at 325° F. for 5 min. to drive out diluent.

P.H.R. level discussed. At 35 parts of plasticizer, the resins investigated (Fig. 1) would all form fluid pastes, although varying widely in rheological properties. Figure 7, p. 133, shows that at 20 P.H.R. of plasticizer, only one of these three resins will wet down and form a cohesive workable dispersion by using an all-aliphatic diluent (Recipes M through R). Five additional parts of aliphatic diluent (Recipe R) reduce both high- and low-shear viscosities further.

Formulations S, T, and U are the result of another attempt to provide workable pastes with Resins X and Y. Here the diluent has been made more polar by the replacement of 25% of the aliphatic diluent with MIK. Resin Y still fails to paste, but Resin X this time formed dispersion which would require additional diluent to render it usable.

It appears, then, that at this low level of plasticizer, the choice of resin is of even greater significance than before. It also appears that it is possible to prepare low plasticizer level organosols with very low Severs and Brookfield viscosities through exclu-



FIG. 10: Laboratory coater.

sive use of low-cost aliphatic diluents and the proper wetting agent.

Fusion conditions

One of the more difficult properties of an organosol film to measure is its degree of "cure." There are several physical tests that may be selected as a criterion of this property. The selection of one or more of these tests should be based upon their ability to simulate the actual stresses to which the finished product will ultimately be subjected.

To study this property, a VR-50 organosol was fused under a variety of baking time and temperature conditions. Results are shown in Fig. 8, p. 133.

The initial slopes of the tensile and tear curves indicate that, for the shorter baking periods, insufficient time has elapsed to bring the films up to the oven air temperature. Films cast on glass or thick aluminum plates will extend this time compared with castings on a thin steel or aluminum panel. Thus, a mere recital of oven air temperature and baking time are insufficient to describe any set of fusion conditions. What are required are temperature and time at temperature of the vinyl film itself. If sufficient time has elapsed, oven air and film temperatures will be practically identical.

Ultimate tensile data show little sacrifice in this property when films are baked as low as 325° F. However, the longer baking time required to bring the organosol to this temperature suggests the use of higher oven temperatures in order to bring the casting to 325° F. in a shorter time. The rapid and progressive increase in tensile properties at 400° F. results from the volatilization of plasticizer from the film at this relatively high temperature. The rapid loss in weight of an organosol film baked under both moderate and severe conditions is shown in Fig. 9, above.

The ultimate elongation properties (Fig. 8) also indicate sensitivity to the loss of plasticizer at prolonged fusion conditions. Again, 325° F. is sufficient to develop full fusion (To page 170)

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Giant airhouse for Army

The recent erection of the Pentadome, a highly developed form of air supported structure, is a striking example of what can be done with the concept of airhouses. While the specific structure was developed to serve as a missile maintenance shelter, its installation suggests a variety of uses: maintenance park operations, depot-type storage, and the like.

The Pentadome consists of a central dome of 150-ft. diameter, 85 ft. high, to which are attached four smaller domes of 100-ft. diameter and 50 ft. high. The building can reportedly support a constant wind load of 70 mph.

The Pentadome was engineered and fabricated by Birdair Structures, Inc., Buffalo, N. Y., according to Army specs. Basic material for the smaller domes is 5½-oz. nylon coated with vinyl to a weight of 18 oz./sq. yd.; the large dome is made of 10 oz. base fabric coated to 25 oz./sq. yd. A total of

18,000 sq. yd. of material were used in this structure.

The main dome is made in five sections, the smaller ones in two each. These sections are electronically heat-sealed. Sewing is done on non-structural elements. Area covered is 50,300 square feet.

Cost of this structure, including engineering design and all phases of fabrication was \$180,000. Birdair anticipates that future shelter of this type, on a production basis, will cost considerably less.

Basic fabric was supplied by Wellington Sears Co., New York, N. Y. Coated material by H. M. Sawyer & Son Co., Watertown, Mass. Peerless Electric Co., Warren, Ohio, supplied the inflation and pressurization blowers that keep the structure erect.

PE for brass in hinge

A number of advantages were gained by C. F. Church Co., Holyoke, Mass., in switching from

chromium-plated brass to Marlex high-density polyethylene for the hinge on its popular priced line of toilet seats. While the company will not disclose any production details or price comparisons, the switch is expected to lower manufacturing cost somewhat, eliminate the problem of corrosion (which has traditionally tarnished toilet seat hinges), and make possible a more pleasing color decor in the bathroom.

Except for the switch in material, no major design change is involved. Like metal hinges, this one is also made in seven parts.

Attachment to the seat components is by standard screws.

ABS saves 2/3

By molding the shroud protecting the operating mechanism of two new fire extinguishers with ABS (acrylonitrile-butadiene-styrene) resin, production costs were reduced by more than ⅔ over previously-used die-cast metal parts.

According to the manufacturer of the fire extinguishers, Walter Kidde & Co., Belleville, N. J., the savings were made possible because finishing, drilling, and machining operations, necessary with die-cast metal components, were eliminated without any increase in tooling cost.

In this application, Kidde engineers selected ABS for its impact strength in the wide temperature range over which the portable extinguishers operate. Other ABS properties leading to the choice of this material were 1) dimensional stability; 2) light weight with high impact strength; 3) resistance to corrosion.

The shrouds are made in two different sizes—one for a 2½-lb. extinguisher and the other for a 5-lb. model. The housing for the 2½-lb. unit is molded in a two-cavity mold on an Impco machine on a 60-sec. cycle, with a shot weight of about 7 (To page 138)



OUTSIDE (top) and inside (bottom) view of Pentadome.





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NEW DEVELOPMENTS

(From page 136)



ounces. In molding the 5-lb. model's housing, cycle and shot weight are about the same, but a single cavity mold is employed.

Marbon Chemical Div., Borg-Warner Corp., supplies the Cyclacol ABS. The shrouds were molded for Kidde by Modern Molders, Inc., Kenilworth, N. J. Design by Henry Dreyfuss.

New loom shuttle

Laminated plastics have successfully invaded another stronghold of wood: the loom shuttle.

Originally, shuttles for high-speed looms were made of dogwood, a low-cost material, but one

STAGES IN the production of laminate shuttle, top to bottom: The two side members and "plugs" from which ends are made; pointed ends are formed later from cylindrical preforms; steel tips are molded integrally to withstand the shock of the "pickers," and after molding are machined to a point.



that presented a serious problem of wear. To overcome this problem and thus lower ultimate cost, Formica Corp. and Draper Corp. jointly developed a resin-impregnated cotton laminate that could withstand the terrific beating given a high-speed shuttle.

Exact cost comparisons of the plastic shuttles with wood shuttles are difficult to make, says a Formica spokesman. So many different models are produced for an equally large number of uses that the Formica accounting department hesitates to cite a figure. The molded shuttle is roughly three times more expensive to make than a wood shuttle—but it lasts about six times longer. Roughly, the plastic shuttle is only half as expensive, or less.

Multiple strips of uni-directional cotton duck, saturated with resin, make up the sides of the shuttle. These are pre-molded into a frame, with a slot down the center for the bobbin. The pointed ends of the shuttle are formed later from a quantity of macerated cotton duck, also saturated with resin. By using macerated material, the compound curves of the heavy ends are more readily molded. The ends are molded around steel tips which are machined to a point after the shuttle is completed. These steel tips were incorporated in the design so that the shuttle could withstand the shock of the "pickers," the heavy arms which strike the shuttle and propel it back and forth.

The macerated material used in the ends of the shuttles is preformed on Stokes Model 294 presses into "plugs," flat discs three inches in diameter and 1½ in. thick. These "plugs," which contain an exact quantity of material, are pre-heated to molding temperatures in a Girdler high-frequency dielectric heating unit and forced under pressure into the mold for the ends. The heat and pressure of the final molding bonds the macerated material to the preformed sides. This completes the two-stage, two-material operation. After molding, the

flash is removed and the steel tips are machined to a point.

Final molding is carried out on a battery of eight Stokes 300-ton Model 727 semi-automatic transfer presses in two-cavity molds.

Easier use epoxy

Placing a turnkey across both tubes of a two-component epoxy solder simplifies dispensing of the resin-hardener system and assures that the required propor-



tions are always exactly maintained. Although each compound is of a different viscosity, turning the key will dispense equal amounts of both. The solder is manufactured and packaged by Fybrglas Industries, Chicago, Ill. Cost of the package shown is \$1.79 in quantity lots.

PE croquet sets

Competitively priced with the better-quality wooden sets, a line of polyethylene croquet sets has been added to its arsenal of molded PE toys by Tigrett Industries, Jackson, Tenn. There are three different sets, retailing at \$7, \$10, and \$12. Principal advantages claimed for the new pieces are light weight, non-breakability, and molded-in color.

The 7-in. mallets are molded in six cavity molds on a 12-oz. Reed-Prentice machine. Intermediate flow, high-gloss polyethylene is used on a 30-sec. cycle.

The balls are formed in four cavity molds on a 6-oz. machine, using a 15-sec. cycle. To complete the 3¼-in. balls, halves are heat fused. Tennessee Eastman supplied the low-density PE.

(More on page 140)



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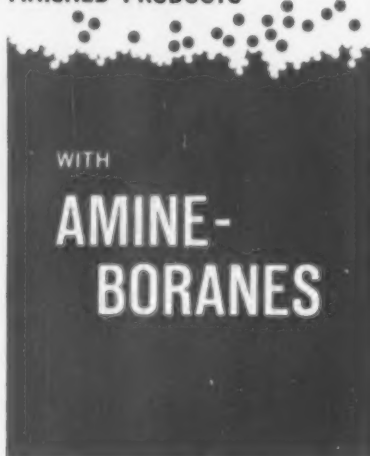
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Propionate for lighter

In designing its Imperial Redi-Flame lighter, Brown & Bigelow, St. Paul, Minn., chose Celanese Forticel propionate for the housing. The lighter, a highly engineered butane-burning device with adjustable flame, is sold direct to businessmen as a de luxe remembrance advertising item in a variety of promotion programs. Price is \$16.95.

According to a B & B spokesman, the material was selected over metal (die cast aluminum was the only one being considered) because of lower piece cost; over polystyrene because it is stronger; more easily molded, and more acceptably mottled; and over butyrate because of better odor characteristics; being comparatively soft, the material also reduces the noise of the flame-activating mechanism.

Flame resistance was not a problem, because a metal cap

fitted into the propionate housing makes it impossible for the flame to reach the plastic material.

The housing is molded in a four-cavity mold on a 9-oz. H-P-M injection molding machine in Brown & Bigelow's own plant.



PROPIONATE-HOUSED lighter incorporates a metal front plate, which prevents the flame from reaching the thermoplastic material.

MOTTLED effect is achieved during molding; propionate was found most suitable for achieving this effect.



BROWN & BIGELOW engineer Len LaBelle (left), and machinist Carrol Kelly, examine four-cavity 2500-lb. mold used in making propionate case for lighter. Several test moldings are on table.



RP housing for office machine

The sleek, functional enclosure of Minnesota Mining's new Secretary model Thermo-Fax copying machine, which last year received an award for design excellence from the Industrial Designers' Institute, marks another milestone in the growing use of plastics for business machine housings.

Styled by Harley Earl Associates, Warren, Mich., the Thermo-Fax housing is of reinforced plastics construction, combining light weight and the ability to endure years of rugged

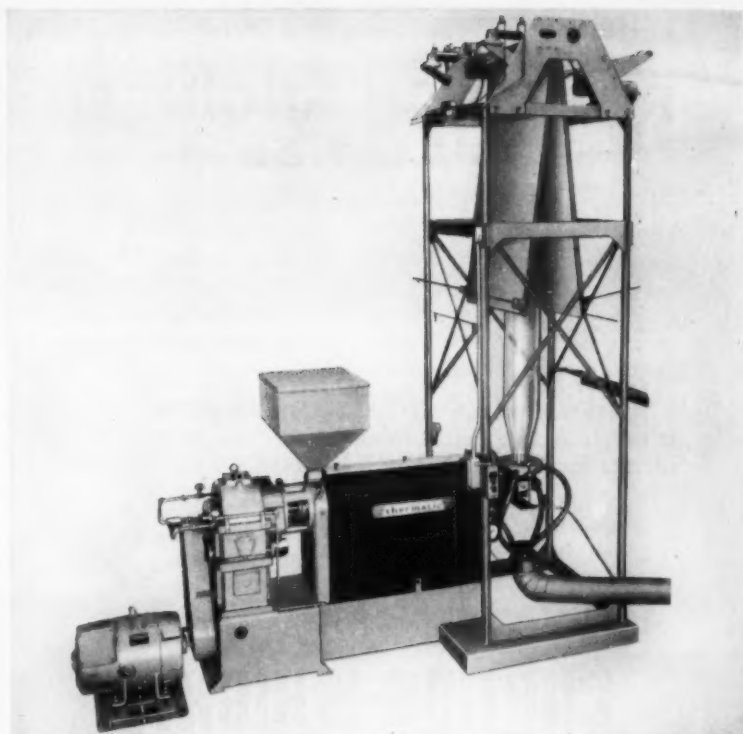


office service without denting. With compression molded reinforced plastics, costly stampings, castings, finishing, and assembly operations which might have been required with a metal housing have been eliminated.

"We were looking for a material which could be made in one piece, using only one hinge for opening, so that the operator could open it easily to clean and service," stated S. M. Highberger, chief designer of the machine at Harley Earl Associates. "Reinforced plastic was the only possible material. It made the machine truly modern—easy to use, operate, and maintain.

Of the exterior case, only the name plate, control panel and entry table are of metal. Operation of the machine is conveniently controlled by a decorated knob injection molded of Lucite acrylic material.

The case is produced in single-cavity matched molds by Zenith Plastics Div., Minnesota Mining & Mfg. Co., Gardena, Calif., using fibrous glass reinforcement supplied (To page 142)



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North-central Pennsylvania Location


Graduate chemical engineer with 1-3 years experience in laminated and injection-molded plastics. Must be familiar with mold design and the chemistry of plastic formulation. Will work on development of prototype parts as well as assist in carrying out a general program in plastics research.

The above position is with the Research Division, at Quehanna, in the picturesque area of North-central Pennsylvania, 40 miles north of State College, the home of Pennsylvania State University.

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by Johns-Manville and Owens-Corning Fiberglas Corp., while the polyester resins are supplied by the Minnesota Mining & Mfg. Co.

Epoxy for SAGE

Light, weatherproof towers and antenna housings, made of epoxy resin reinforced with glass and acrylic fibers, are now in general use by the country's SAGE (Semi-Automatic Ground Environment) radar network.

An aluminum truss of 55 ft. supports a 45-ft. monotube tower, which is mounted atop the tube. The manufacturer of the towers, Redman Pattern Works, Kansas City, Mo., reports that approximately 45 towers have been ordered to date.

The monotube unit is 18 in. in diameter at the bottom, tapering to 9 in. at the top. The epoxy capsule, pressurized at 6 p.s.i. to assure absolute protection from



NEW RADAR
tower rises 110 ft. Use of reinforced epoxy for 45-ft. monotube and 10-ft. radar capsule affords all-weather protection and easier maintenance.



moisture, completely encloses the radar sensing device.

Maintenance of the SAGE towers is now easier, since the self-contained radar capsule can be replaced in 20 min. by an untrained crew. In addition, the tough epoxy cap serves as a shipping and storage container for the radar antenna. Flanges at the top of the monotube and the bottom of the antenna capsule are integral with each part. A phenolic plate, placed as a gasket between the flanges, serves as a positioning device for permanent location of the antenna within the capsule.

Both monotube and capsule are manufactured by a filament winding operation, using room temperature epoxy resins supplied by Union Carbide Plastics Co. The final layers of reinforcement are Dynel acrylic fibers for better protection from deteriorating ultra-violet rays. The entire assembly is postcured for 3 hr. at 200° F.

Approximately 925 lb. of material, half of which is epoxy, go into the manufacture of the capsule and monotube tower. Since there are 100 SAGE cities, each requiring 21 towers, a potential use of 2100 units can be foreseen. Also looking to the future, Union Carbide Plastics Co. states that reinforced epoxy structures as tall as several hundred feet, embodying the same structural advantages of the SAGE towers, are completely feasible.

Cost saving boat bumper

Designed for installation at the time of joining deck and hull section of a boat, extruded curled "T" bumper is claimed to enable boat builders to cut adhesive and application costs by as much as \$2 per linear foot. Based on Goodrich Geon 101-EP, the bumper is extruded by Rex Corp., West Acton, Mass. This is the tenth standard bumper shape introduced by the firm, and the first specifically engineered for application during boat construction. Price per linear foot is 11 to 15¢, depending on quantity. Standard lengths for the bumpers are 17 and 34 feet; and (To page 144)

PLANT LOCATION QUIZ



Q Why did Steel Scaffolding Company move to WESTern PENNSylvania?

A (1) 100% Financing at Low Interest—all details of building and financing the plant handled by the community nonprofit industrial development corporation. (2) A Friendly Community—cooperative attitude of the people and local civic groups. (3) Room to Grow—away from a crowded eastern metropolis to an area with ample room for future expansion. (4) Skilled Labor—a plentiful supply of dependable workers always available. (And they are already setting new production records!) (5) Accessibility—close to steel suppliers and raw materials and in the heart of major markets.

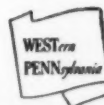
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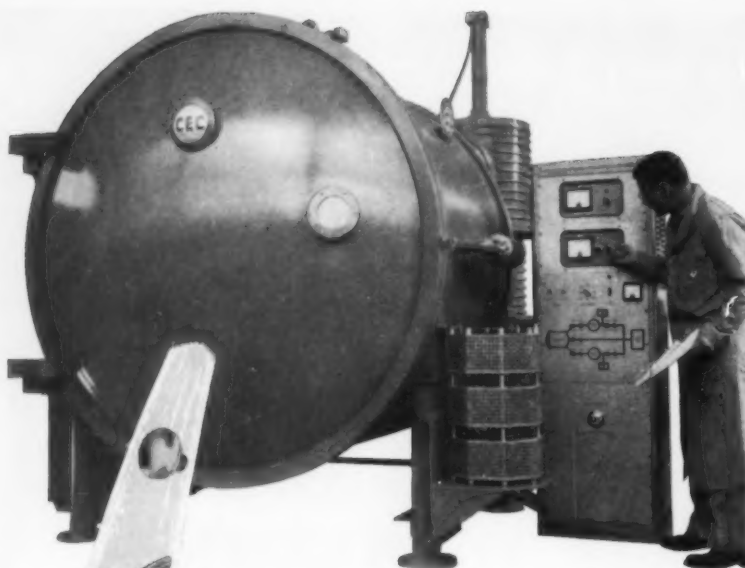
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SALES AND SERVICE OFFICES IN PRINCIPAL CITIES



T-PROFILE extrusion emerging from die. Operator makes adjustment.



DECK AND HULL are joined and bumper installed at same time.

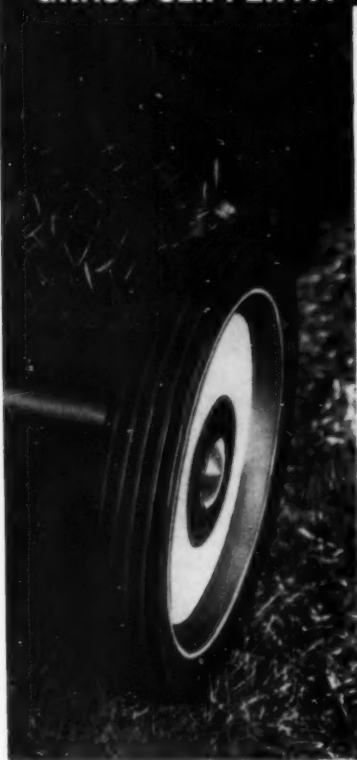
because it is installed at the time the boat is assembled, it does away with extra adhesive cost. The bumper is applied at the time the deck section is joined to the hull with reinforced plastics, which also bonds the bumper in place without any other secondary operation.

Nylon snap bushing

A new nylon bushing which snaps into a $\frac{7}{8}$ -in. diameter chassis hole and locks under finger pressure is now being produced by Heyman Mfg. Co., Kenilworth, N. J. No threaded holes or nuts are required to hold it in place, and it cannot be removed unless the nylon step-clips are compressed.

The Heyco nylon snap bushing is UL and CSA approved, and may be locked into panels of varying thickness up to $\frac{1}{4}$ inch. It is available with various inside diameters, and requires no tools to install.—End

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**Wherever
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of the
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For any company searching out new and bigger markets, the plastics field has a unique, vast potential. Its expansion is so rapid that its productive capacity has just about doubled every five years! In 1958 consumption of plastics and synthetics again broke the previous year's record.

Plastics are making possible new achievements in fields as diverse as building construction, plumbing, electrical appliances, aviation, communications. A 1958 model car uses more than 20 pounds of plastics compared with $\frac{1}{2}$ for its '41 counterpart . . . half of all toys are plastic . . . increasing quantities are being used in boat hulls, aircraft wings, truck trailer bodies, upholstery, flooring, packaging . . . the list is almost endless.

If you have anything to sell . . . chemicals, materials, machines, or supplies . . . that the plastics field can use, now is the time to establish your company firmly in the market—to grow *fast* in new directions.

The all-paid circulation of MODERN PLASTICS magazine covers the two basic areas of this booming market:

The "end-users" of plastics. Fully half of the magazine's total audience are manufacturers in other industries (not the plastics industry) who use plastics and plastics parts in large volume. Many of them operate their own plastics-working facilities; others "farm out" their plastics converting operations to contract services; and many of them employ both methods.

The plastics industry itself. MODERN PLASTICS literally "blankets" the industry: the contract converters of plastics materials (molders, extruders, fabricators, etc.); the mold and die makers; the makers of resins and molding compounds; the makers of film, sheeting and laminates.

From its founding in 1925, MODERN PLASTICS has played a major role in the plastics field's continuing growth. has constantly been in the vanguard of new product explorations. As a result, it's literally "the" plastics magazine, with a record-high circulation of 30,000 paid subscribers that has matched the market's growth stride for stride since the industry's infancy. And, as the recognized first choice of advertisers to the market, it carries a greater volume of advertising than the rest of the plastics periodicals combined.

If you haven't yet explored the sales potential of the plastics field for the products your company makes there's no better time to begin than now. A letter of inquiry to the Market Research Department of MODERN PLASTICS is an excellent way to get your investigation underway.

**...OR BEARD
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Like the flourishing market it serves, Modern Plastics is not limited by industry boundaries. It goes wherever manufacturers process plastics materials or put them to product use. Alone of all industrial publications, it delivers to these users the *complete* range of news, engineering and technological data important to them all.

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LITERATURE

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"Adhesive Bonding of Reinforced Plastics," by H. A. Perry.

Published in 1959, under the sponsorship of Owens-Corning Fiberglass Corp., by the McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. 275 pages. Price: \$8.75

In discussing the limitations of adhesive bonding the author says, "Some knowledge of statistics and of engineering mechanics is mandatory for the design of an effective [adhesive-bonded] joint." He then proceeds to do a remarkably good job, in limited space, of presenting the essential mechanics and statistics. Subsequent chapters cover laminating resins and adhesives, rheology, general properties, and mechanical testing of adhesives, adherend materials, process factors in bonding, equipment, quality control of bonds, and design of joints. The book is clearly written, packed full of quantitative information. It will be of interest to anyone with adhesive bonding problems.—J.F.C.

Molding machinery. Specifications, pump and wattage selection data, performance histories, etc., for extrusion and compounding systems, mold temperature controllers, injection, transfer, and compression molding machines, laboratory and die-sinking presses, granulators and pelletizers, and other plastics production equipment. 10 pages. *Barnett J. Danson & Assocs., Ltd., 1912 Avenue Rd., Toronto 12, Ontario, Canada.*

Custom molding. "How to Buy Custom Molded Plastics" is a capsule report to manufacturing management seeking ways to lower production costs and to improve products. Includes 14-question check list. 6 pages. *Plastics Div., Monsanto Chemical Co., Springfield, Mass.*

Polyethylene. Properties, types, injection molding, molding problems, special techniques, applications, etc., for Hostalen, a Ziegler-type linear low-pressure polyethylene. 50 pages. *Farbwerke Hoechst AG, Frankfurt-Hoechst/Main, West Germany.*

ASTM Standards. An index to standards for materials and material testing, including a list of titles in numeric sequence of all ASTM serial designations. 212 pages. Price:

\$1.00. *American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.*

Labels. Brochure describes shape, size, color, etc., of a line of pressure sensitive labels for plastics and other uses, including description of labeling equipment, manual and automatic dispensers, label imprinter, etc. 8 pages. *Avery Label Co., 1616 S. California Ave., Monrovia, Calif.*

Plastic boxes. Sizes, shapes, prices, etc., for a line of hinged, telescope and slide cover, square and rectangular, round, and other sized plastic boxes. 20 pages. *Bradley Industries, 1650 N. Damen Ave., Chicago 47, Ill.*

Silicones. Brochure describes the major G-E silicone products and their uses. Bulletin CDS-129A. 8 pages. Silicone rubber selector chart, designed to assist designers and engineers in selecting the proper type of silicone rubber for their requirements, including data on applications, typical properties, primary classes, and standard industry and military specifications. Selector Chart CDS-145. 4 pages. *Silicone Products Dept., General Electric Co., Waterford, N. Y.*

Polyurethane elastomer. Processing, curing, tensile properties, coloring agents, compounding variables, blends with resins, solvent resistance, adhesion, thermal stability, aging, uses, and other technical data on Genthane-S, a polyurethane elastomer. Bulletin GT-2. 24 pages. *Chemical Div., General Tire & Rubber Co., Akron, Ohio.*

Radiation processing. Technical and economic factors which must be considered in applying electron-beam radiation to industrial processing, including cross-linking of plastics and sterilization of plastic containers. Bulletin P. 32 pages. *High Voltage Engineering Corp., Burlington, Mass.*

Stabilizers. Typical properties, recommended applications, etc., for two new liquid barium-cadmium-zinc stabilizers. 4 pages. *Ferro Chemical Corp., Bedford, Ohio.*

Production facilities. Brochure describes production facilities and services of the firm, which specializes

in silk screen printing on plastics, glass, and metal products. 16 pages. *Ceragraphic, Inc., 171 Newman St., Hackensack, N. J.*

Silicone defoamer. Properties, applications, uses, etc., for Antifoam B, a water dilutable silicone defoamer. 4 pages. *Dow Corning Corp., Midland, Mich.*

Plasticizers. "Seven Plasticizers for Nontoxic Applications" gives properties, specifications, comparative performance data, etc., for Santicizer 141; Santicizer E-15 (ethyl phthalyl ethyl glycollate); Santicizer B-16 (butyl phthalyl butyl glycollate); diisobutyl adipate (DIBA); diethyl phthalate; dioctyl phthalate (DOP); and diisooctyl phthalate (DIOP). 10 pages. *Organic Chemicals Div., Monsanto Chemical Co., 800 N. Lindbergh Blvd., St. Louis 66, Mo.*

Re-usable shipping cases. Construction features, uses, sizes, specifications, etc., for a line of re-usable vulcanized fibre shipping cases. 2 pages. *Continental-Diamond Fibre Corp., Newark, Del.*

Plastic lab apparatus. Specifications, descriptions, etc., for a line of polyethylene and polypropylene laboratory ware, including beakers, funnels, tubing, graduates, carboys, bottles, pipets, tanks, etc. Catalog H459. *The Nalge Co., Inc., Box 365, Rochester 2, N. Y.*

Double rotation oven. Purpose, design, operation, and technical data for a double rotation oven for the measured molding of vinyl plastisol. 4 pages. *E. B. Blue Co., Connecticut Ave., S. Norwalk, Conn.*

Butynediol. Physical and chemical properties, storage and handling, uses, analytical procedures, references, etc., for butynediol, a polyfunctional raw material used as a polymerization accelerator, chain extenders for polyurethanes, among other uses. 38 pages. *Acetylene Chemicals Dept., Antara Chemicals, 435 Hudson St., New York 14, N. Y.*

Saws and cutters. Specifications, prices, uses, etc., for a line of carbide-tipped saws, cutters, and knives, which are used for sawing solid and laminate plastics. (To page 148)



"WE DIDN'T HAVE TO BUY OUR FOURTH NRC VACUUM COATER

Thanks to the new NRC Mechanically Refrigerated Cold Trap"

... says Jack Selsemeyer

*Production Manager, Kent Plastic Corporation
Evansville, Indiana*

"In the spring of 1957 we decided to buy our fourth NRC vacuum coater. With the increased demand for our vacuum metallized plastic medallions and nameplates, that was the only way we knew of getting through the dread summer months without sacrificing the top quality and prompt delivery on which we've built our business. Summer's always been tough because the high humidity has caused our metallizing cycles to triple and our reject rates to rise

"We'd already placed the order for the fourth coater, when NRC engineers introduced us to the new mechanically refrigerated cold trap. At first we were skeptical, because we knew other attempts to solve the humidity problems with cold traps had proven expensive and ineffective. However, the ability of the NRC mechanical refrigerator to

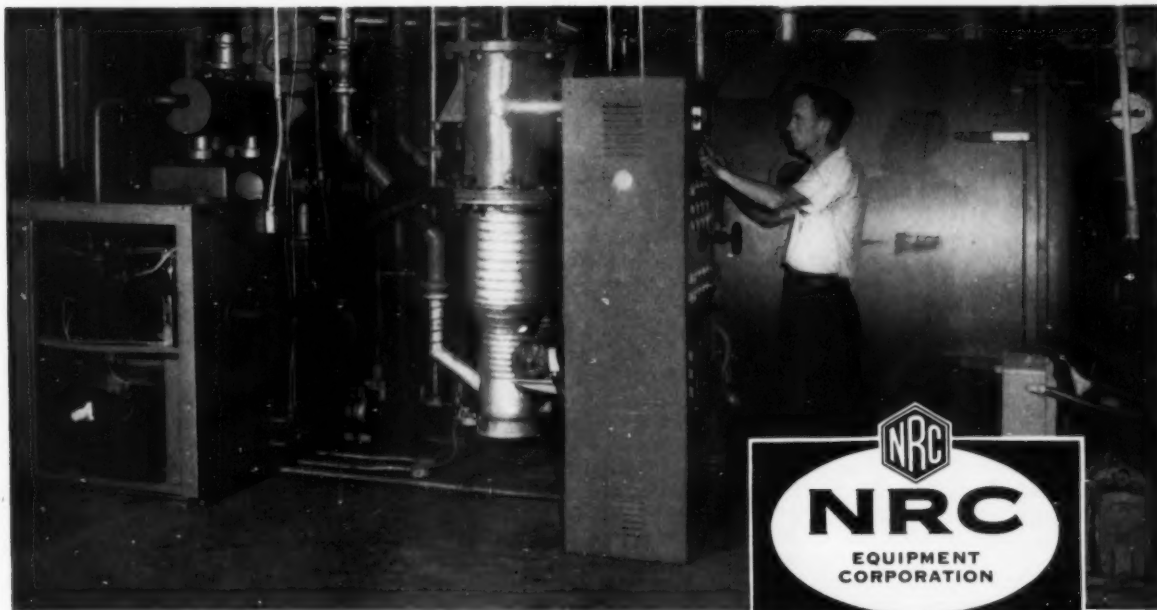
maintain the cold trap at -150°F , and the special design features of the latter made us decide to try it on one coater.

"Results were spectacular. Production rates and rejects were almost independent of humidity, so that our hot weather costs are way down and we've got a competitive advantage in being able to make good on deliveries. Unfortunately for NRC, after we installed similar systems on our other two coaters we had so much more usable summer capacity that we didn't need the fourth coater."

The NRC Mechanically Refrigerated Cold Trap Assembly consists of a special refrigerator and one or more copper coils flange mounted for positioning directly above each diffusion pump. It offsets high humidity by freezing out water vapors

before they can add to the load on the diffusion pumps. The assembly is easily installed in coaters equipped with NRC pumping systems and is simply modified for other equipment. The standard 4 HP refrigerator will maintain two traps at -150°F , the temperature found most effective for coaters operating at the usual 0.5 microns pressure. More powerful refrigerators are available for coaters operating at lower pressures or equipped with more than two diffusion pumps.

This development is the latest of the many contributions which NRC has made to profitable metallizing. If you now operate or are considering the purchase of a vacuum coater, it will pay you to ask your nearest NRC sales engineer for full details on how you profit from these contributions. Write or phone today.



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LITERATURE

(From page 146)

cutting veneers and double-faced laminate panels, and other uses. 12 pages. *Lemmon and Snoap Co.*, 2618 Thornwood St., S. W., Grand Rapids 9, Mich.

Vinyl plastisols. Advantages, suggested formulations, etc., of using plastisols, organosols, and solution coatings in preparing vinyl wrinkle finishes. Technical Release 40. 5 pages. *Union Carbide Plastics Co.*, 30 E. 42nd St., New York 17, N. Y.

Pigments. Test methods for determining the greening resistance and tarnish resistance of gold bronzes in vinyl ink applications. Includes sample "greening" test plastic. Technical Bulletin 511. 1 page. *Claremont Pigment Dispersion Corp.*, 39 Powerhouse Rd., Roslyn Heights, N. Y.

Dry colorant. Advantages, standard colors, special colors, special effects, directions for use, etc., for the dry coloring of thermoplastics with Drycol colorants. 4 pages. *Gering Products, Inc.*, Kenilworth, N. J.

Cobalt activators. "Ferro Cobalt Activators for Polyester Curing" lists the line of cobalt compounds available and describes their use as activators when used with standard catalysts in the curing of polyester resins. Technical Bulletin 48. 3 pages. *Ferro Chemical Corp.*, Box 349, Bedford, Ohio.

Chemical testing facilities. Brochure describes the chemical laboratory testing and research facilities, including those designed for plastics. Bulletin 5901. 4 pages. *United States Testing Co., Inc.*, 1415 Park Ave., Hoboken, N. J.

Automatic guiding equipment. Specifications, functions, uses, etc., for a line of automatic guiding equipment, including single automatic, single manual-automatic, and multiple automatic. 34 pages. *Fife Mfg. Co.*, Box 9815, Oklahoma City 18, Okla.

Media pans and bins. Design features, uses, etc., for a line of storage and handling of all barrel finishing media. Bulletin 401. 2 pages. *Wheelabrator Corp.*, Mishawaka, Ind.

Cellulose wadding. Description, specifications, uses, advantages, etc., of Cel-Fibe cellulose wadding for wrapping, packaging, blanketing, cushioning, padding, insulating, fil-

tering, and quilting. 8 pages. *Cel-Fibe Div., Personal Products Corp.*, Milltown, N. J.

Blenders. Specifications and dimensions, uses, etc., for a line of mixers and blenders. Also includes tables of commonly used engineering constants. 8 pages. *The Falcon Mfg. Div., First Machinery Corp.*, 211 Tenth St., Brooklyn 15, N. Y.

Color test. Spot test for differentiating polyester from polyether based urethane polymers. 3 pages. *Mobay Chemical Co.*, Pittsburgh 34, Pa.

Hydraulic components. Hydraulic pneumatic and vacuum catalog containing flow charts, J.I.C. piping, and data on "O" ring seal tube fittings, flare and pipe fittings, tube benders, and other hydraulic components. *Lenz Co.*, Box 1044, Dayton 1, Ohio.

Polyethylene. Properties, extrusion conditions, available grades, etc., for Rigidex polyethylene blown (layflat) film, Rigidex polyethylenes Types 9 and 15. Technical Information Sheet No. 6. 4 pages. *British Resin Products, Ltd.*, Devonshire House, Piccadilly, London W1, England.

Expandable polystyrene. Physical properties, uses, etc., for Dylite, expandable polystyrene, as a shock-absorbent and waterproof packing for a variety of jobs. 4 pages. *Plastics Div., Koppers Co., Inc.*, 801 Koppers Bldg., Pittsburgh 19, Pa.

Motion picture listing. "Film Catalog of the Plastics Industry" lists the motion pictures, film strips, and slide sets that are available, including company producing, mm. size, running time, etc. 30 pages. *The Society of the Plastics Industry, Inc.*, 250 Park Ave., New York 17, N. Y.

Machinery-equipment buyers' guide. Specifications, uses, etc., for the hydraulic machinery and equipment available from members of this association. Text in English, French, German, and Spanish. *The Hydraulic Assn. of Great Britain*, 94/98 Petty France, London SW1, England.

Testing machines manual. Comprises 87 different broad categories of physical testing areas—abrasion, hardness, thickness, moisture and similar testing categories, including equipment necessary for each task. Machines not restricted to U. S.

manufacturers. Available on limited basis to technical and purchasing executives. 224 pages. *Testing Machines, Inc.*, 72 Jericho Turnpike, Mineola, L. I., N. Y.

Electric heating elements. Describes and diagrams forms of special strip heaters for heat transmission in 100 to 1200° F. range. Includes uses, wattages, sizes, prices, etc. 4 pages. *Acra Electric Corp.*, 9901 Pacific Ave., Franklin Park, Ill.

Equipment for extruders. Brochure outlines the drive that most economically meets the user's requirements. Analyzes user's present drive system in view of its profitability, flexibility, and correctness for specific application. Bulletin GEA-6909. 8 pages. *General Electric Co.*, Schenectady 5, N. Y.

Melting tanks. Specifications, uses, features, etc., for a line of industrial melting tanks for heating, melting, and dipping, including data on bench-type tank for plastic strip coating materials. Catalog TA-P-1. 8 pages. *Aeroil Products Co., Inc.*, 69 Wesley St., S. Hackensack, N. J.

Protective switches. Specifications, uses, etc., for a precision snap-action switch which detects misfeed of material in various production operations; also manual reset switches for die interlock protection. 2 pages. *Micro Switch, div. of Honeywell*, Freeport, Ill.

Plastic film safeguards. "Plastic Film—Correct Use and Misuse—with Helpful Hints to Parents" is designed to educate parents and young children on the proper use of plastic film coverings. 6 pages. *The Society of the Plastics Industry, Inc.*, 250 Park Ave., New York 17, N. Y.

Tumbling barrels; compounds. Specifications, uses, etc., for a line of tumbling barrels and compounds for the plastics and other industries. 14 pages. *Tub-L-Matic, Inc.*, 10 St. Mary's St., Stamford, Conn.

Tooling facilities. Brochure describes facilities and some of the precision molds and dies designed and built by the firm. 4 pages. *Center Tool & Mold Co., Ltd.*, Windsor, Ont., Canada.

Diepoxides. Typical properties, hazards, chemical reactivity, uses, etc., for Dicyclopentadiene dioxide, which is a difunctional epoxide that can be used both as a modifier of conventional epoxy resins and as a primary building block for an epoxy resin system. Bulletin 95. 3 (To page 150)



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1 3/4"	3 1/2"	2 1/2"	500	Dual
1 3/4"	1 1/2"	2 3/8"	350	230/240

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Thermel, inc. 9410 W. Robinson Rd. Franklin Park, Ill.

pages. Similar data on Limonene dioxide, a material combining the reactivities of an internal and an external epoxy group in the same material. Technical Bulletin 96. 4 pages. Chemicals & Plastics Div., Food Machinery & Chemical Corp., 161 E. 42nd St., New York 17, N. Y.

Epoxy plasticizers. Features, physical properties, compound properties, uses, etc., for a line of epoxy plasticizers. 6 pages. Thompson Chemical Co., Pawtucket, R. I.

Polymeric plasticizer. Specifications, physical properties, uses, tests, etc., for Harflex 330, a polymeric plasticizer which lends permanence to vinyl compounds. 6 pages. Harchem Div., Wallace & Tiernan, Inc., 25 Main St., Belleville, N. J.

Acrylonitrile - butadiene - styrene pipe. "For Rigid Pipe Applications, Be ABSolutely Sure with ABS Polymers" gives advantages of ABS pipe for oil field work, irrigation and sprinkler systems, industrial piping, potable water systems, etc. 6 pages. "Questions and Answers About Rigid Plastic Pipe made of ABS Polymers." 6 pages. Marbon Chemical Division, Borg-Warner, P. O. Box 68, Washington, W. Va.

Fire prevention. Check list for avoiding loss by fire during prolonged shut-downs (1 day or longer) at plastics plants, including case histories of actual plant losses. The Society of the Plastics Industry, Inc., 250 Park Ave., New York 17, N. Y.

Plastisols and Organosols in Industry. Data Sheet is first of series on vinyls, lacquers, synthetics, enamels, and epoxies. This brochure describes how they are compounded—resins, plasticizers, stabilizers, lubricants, pigments, de-aeration of plastisols, and volatile thinners; how they are applied—slush molding, slush coating, dip coating, extrusion and injection molded, etc. Data Sheet 101. 6 pages. The Stanley Chemical Co., 401 Berlin St., East Berlin, Conn.

Plastics catalog. Sizes, prices, weights, color ranges, grades, etc., of plastic sheets, rods, tubes, films, blocks, and flat tubings; cements, pigments, and miscellaneous supplies, including 2-page comparison of chemical, electrical, and mechanical properties for acrylics, Teflon, nylon, vinyl sheet, acetate, butyrate, styrene, polyethylene, Mylar, Kel-F, reinforced plastics, phenolic, and modified acrylic. 64 pages. Cadillac Plastic & Chemical Co., 15111 Second Ave., Detroit 3, Mich.—End

Blow molding

(From pp. 88-92)

costs approximately one-third that of a six-mold rotary. In the production of dolls, three separate molds are required, one for the body, one for the arms, and one for the legs. A comparison can be made between the use of three single-mold machines and one six-mold rotary machine. As the equipment cost in each case is approximately equal, no allowance need be made for amortization. Building charges, administration and selling costs, etc. can be assumed equal and as the comparison is in relation to the number of parts produced, material consumed will be equal and need not be included. It should also be assumed that both types of equipment are capable of fully automatic operation so no direct labor need be charged. Supervisory labor responsible for machine and secondary operations should be charged directly to the equipment on an hourly basis.

The results of this comparison are presented in Table I and accompanying chart, p. 88. They indicate clearly that up to a production run of about 3.5 million dolls the single-mold machine is more economical.

The picture looks somewhat different with single unit items, such as bottles.

To illustrate the relative economics, we can compare the cost of bottles produced on six rising-mold, single-cavity machines with the cost of bottles blown on one rotary, six-mold machine. The results are shown in Table II and its companion graph, p. 91.

As is apparent from the graph, the battery of single-mold machines is less economical than the rotary. As is also apparent, their difference increases with the number of units produced. However, it should be pointed out that the rotary will not be as versatile as a battery of single-mold machines, and, in existing designs, will always require six molds, however short the run.

What are the markets?

Toys. Judging on the quantity of toy bowling pins, piggy banks, hobby horse heads, etc., now in

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general production, it would appear that the market could consume some 30 million lb. per year ranging from small crib toys to large hobby horses, etc.

Industrial. To date, very little entry has been made by blow molded items into the industrial field. Indications are, however, that volume markets exist in tanks, tank liners, drums, carboys, floats, special ducting, housings, and chemical apparatus, etc. Growth in this field will depend on the vision and enterprise of engineers to exploit the possibilities of the process and develop equipment.

Containers. Most of the growth of the blow molding industry, to date, has been in the production of bottles for the cosmetic and pharmaceutical industries.

Some development has taken place in larger container items, but very little penetration has been made into the rigid-container market presently enjoyed by glass and metal. In this field, plastics are competing with already highly developed produc-

tion techniques which use materials which are cheaper on a pound basis.

High-density polyethylenes allow considerable reductions in weight, however, and in many instances can compete at point of consumer purchase when all factors, such as reduced shipping costs, reduction of carton-board weight and elimination of dividers, etc., are taken into consideration. As a general rule, 20,000 lb. of product can be shipped in plastic containers for the same freight cost as only 14,000 lb. in glass.

In advancing into this market, it is normally necessary to go through a lengthy program of design, testing, and technical development in order to meet the economic and physical requirements of the application. This is justified, however, when the potential market is fully realized. Annual consumption for 1957 is estimated at:

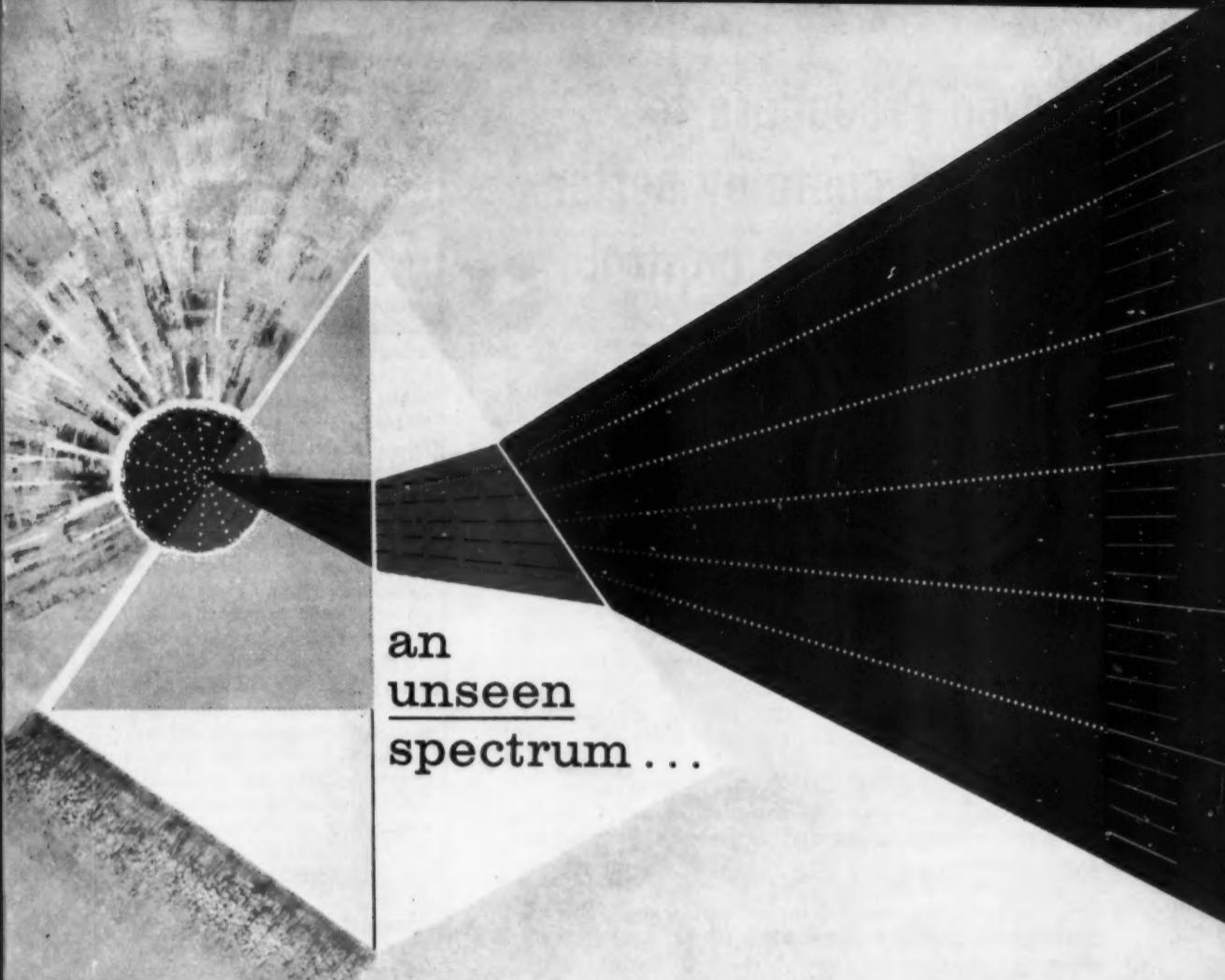
Container	Units
Metal cans	43.5 billion
Glass bottles and jars	20 billion
Collapsible tubes	1 billion
Production of plastic containers	

during the same period totaled only 490 million units, which is decidedly less than 1% of the total potential.

Blow molding, as an industry, has a great potential for growth; but to achieve advancement on a sound basis, full and close cooperation will be necessary between raw material suppliers, producers, equipment makers, design engineers and merchandising personnel.

Specialized equipment will be needed to give high volume production at minimum costs for particular markets, applications, and items.

Other specialized engineering will be required to provide elimination of secondary operations: multi-color labeling in mold at time of blowing; incorporation of filling and capping in the production cycle; combination of injection and blowing in same cavity—particularly for industrial parts—elimination of pinch-off scar in extrusion methods; and automatic scrap blending and return to process units.—End



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It adds up

(From pp. 94-95)

die-cast aluminum; the cover is attached by means of screws which go up through three holes through the bottom of the base into three corresponding bosses in which brass threaded inserts are molded. These bosses, as well as bosses on the lid, are produced in a nine-cavity mold.

The cover is produced in a single-cavity mold on a 16-oz. Reed-Prentice; the lid in a two-cavity mold; the platen wheels and column indicator windows are produced in four-cavity molds. Name plates are run in an eight-cavity mold on a 20-sec. cycle.

The large touch bars (correction and plus-total) are run in an eight-cavity combination mold cycling at 38 seconds. Because of the high cost of double shot tooling, the parts are molded with recessed character and flush-filled with polyester resin, manually applied with a rubber spatula. The excess is buffed off following a baking operation. Paint is not satisfactory for these parts because it tends to sag.

The number keys are two-shot molded of butyrate on existing, amortized tools by Electri Mfg. Co., San Francisco, Calif. Also molded of butyrate is the handle for the manual model. The handle is produced by Shaw Insulator Co., Irvington, N. J.

How problems were overcome

The experience of the molder in producing the cover and lid for these two machines is an interesting example of the role the custom processor plays in the successful development of a product.

In this case, the selection of impact polystyrene for the parts was not an unqualified success. Difficulties developed that led to a switch to modified acrylic, and then back again to impact polystyrene. Here is how Auburn VP E. M. Woodruff describes the chain of events:

"The low price of the material, together with the fact that it has less gloss than almost any other material considered, dictated the original selection of impact polystyrene. After producing the original samples from the mold, how-

ever, it became evident that the part of the mold forming the key-board opening caused an unsightly weld on the front wall of the cover. Lack of strength at this point was not a problem, but discoloration was.

"Modifying the flow characteristics of this material did not correct the condition and we, therefore, switched to about the only other material that seemed suitable, viz., modified acrylic.

"This material did not show a weld but it had a gloss considered too high for a business machine. Furthermore, the cost was high.

"In an effort to reduce the gloss without spray painting, it was then decided to put a very light sandblast finish on the cavity part of the mold and to protect it by hard chromium plating. This was done, and the results were fairly satisfactory—except for the fact that the roughened surface caused the parts to drag when being pulled out of the cavity. Upon our insistence that certain areas which appeared to have a staining condition might get worse, and that,

at best, long range mold maintenance would become a problem, the mold was stripped of chromium and the light sandblast finish removed. The mold was then repolished and replated, and parts run again in impact styrene.

"Since modifications in the impact styrenes had not corrected the original visible weld at the front wall, our next step was to provide, in effect, additional runner system by thickening the underside of the cover down both sides of the front wall. The front wall itself was increased.

"The original gate location, which was at the center bottom of the lid opening, was changed because of an uncontrollable warpage condition to two gates at the midpoint of the lid opening on both the right and left side. This so corrected the warpage condition that no cooling fixtures have been necessary.

"This and the other changes all improved the condition, but not sufficiently to eliminate painting of the styrene parts. We then found that by raising material

and mold temperatures and somewhat lengthening the cycle, eliminated the problem of visible weld and permitted production of the part with molded in color. While the gloss was somewhat higher, it was acceptable to our customer. The material that was finally selected was Dow's 440 impact polystyrene."

Conclusions

Remington Rand's experience with redesigning two of its adding machines is important to the plastics industry for two reasons.

1. It demonstrates anew the economies possible by turning to plastics—at no compromise with product quality.

2. It throws the spotlight on the very important role the custom processor can play in the successful execution of a new product development. As a specialist in plastics material processings, he can bring his solid experience to bear on the many intricate production problems which, in the last analysis, spell the success or failure of a development.—End

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Spouts

(From pp. 96-97)

permanent engagement when the handle clamp screw is tightened. Without this flexible gasket arrangement, Cory would have been compelled to specify much tighter throat dimensional tolerances. The cost, of course, would have been prohibitive.

Which polyolefin to choose

Preliminary tests by the custom molder, Globe Imperial Div., Ainsworth-Precision Castings Co., Rockford, Ill., were made with linear polyethylene. The material was changed to Pro-fax polypropylene, however, when it was found that post-molding shrinkage in some cases made it impossible to slip the polyethylene pouring lips over the glass throat. Since the lip was also to be sold separately as a replacement item, this was an important consideration.

With the change to polypropylene, this difficulty was overcome, as well as a stress cracking problem which developed with certain

formulations of linear polyethylene after the parts had been repeatedly subjected to detergent solutions.

On the pouring lip subsequently designed by Cory for its Nicro stainless steel Perc Royale percolator and serving decanter, a butene-modified high-density polyethylene (Phillips Marlex Series 5000) has worked out very successfully in all respects. In this case, there is no fitting problem, since the throat of the stainless steel bowl can be fabricated to much closer tolerances than the glass model. Also, these parts are used only for original factory production, eliminating any problem which might arise from residual shrinkage during storage and shipment. With this formulation, no difficulty has been experienced with stress cracking, an important factor since the unit is exposed to considerable detergent action during frequent washings.

The combination of the metal body and resilient thermoplastic pouring lip on this model, adds up to lower replacement costs, operating economies, and lower

cleaning costs for clubs, restaurants and dining rooms. Even temperatures encountered in commercial dishwashers do not affect it.

This plastic component, produced by the same molder, has a base diameter of 3¾ in. and maximum height of 4 inches. It is molded with a slot at the back, permitting the part to slip down over an internally threaded handle retainer mounted on the neck of the appliance. Four projecting lugs bordering the slot are drawn into mating blind cores in the root of the phenolic handle when it is bolted in place.

All spouts are molded on 8-oz. Reed-Prentice injection machines.

The favorable cost, performance, and styling factors gained by Cory with its new thermoplastic pouring lips are sure to open new "dispensing" markets for the polyolefins, especially in those areas where the lower heat resistance characteristic of the low-density materials have been a limiting factor up to the present time.—End

ANOTHER NEW IMPCO

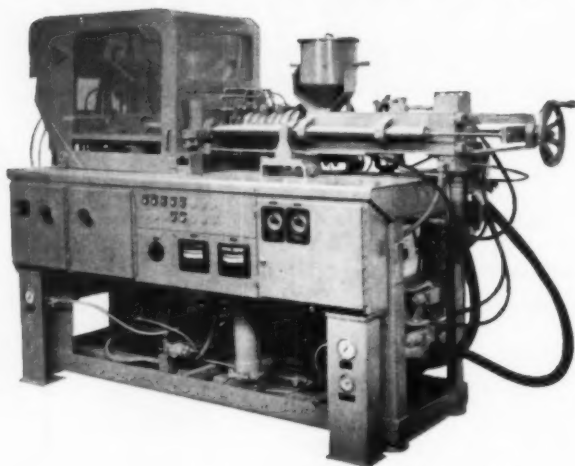
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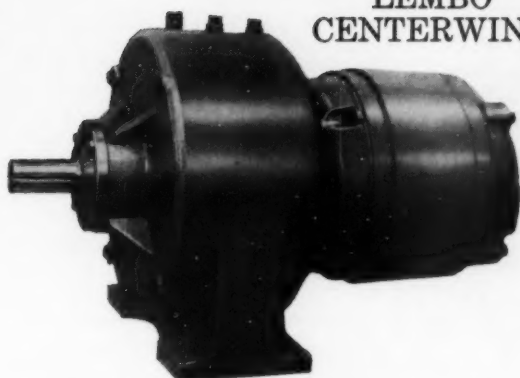
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Thermoform

(From pp. 98-99)

free handling, the company's Watercrayons, used for both stick and brush application, are provided with individual transparent acetate sleeves. The sleeves, from which the crayons are progressively extended as they are used, also help to protect them against breakage.

Aluminum tray eliminated

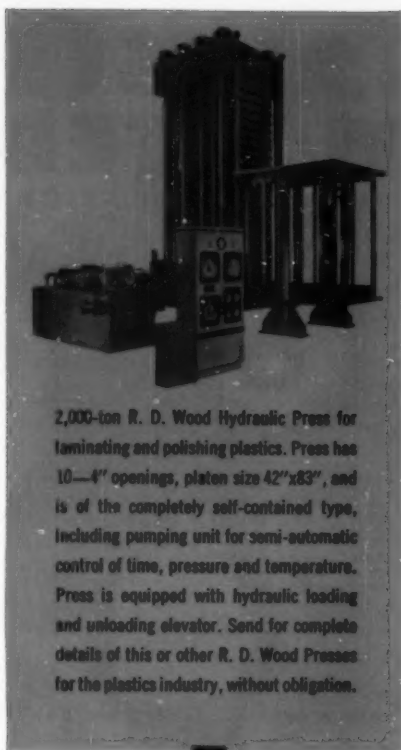
Another phase of Weber Costello's repackaging program involves Alphacolor Brilliants, semi-solid cakes of highly concentrated color pigments. Formerly, the company used small round individual aluminum containers. These snapped into cavities formed in an impact styrene tray-type base, which in turn was slipped into a heavy paperboard sleeve with cellophane lamination over the printing. This package has now been replaced by formed styrene sheet bases (in 8- and 24-unit sizes) having rectangular cavities in which the cakes of coloring material are placed; the metal containers are eliminated.

The paperboard sleeve, in turn, has been discarded in favor of an extruded transparent butyrate cover with grooved sides which grip the edges of the base. This component is extruded by Superior Plastics, Inc., Chicago, Ill.; while letterpress labeling, in red, is being handled by Poster Products, Inc.

Reduction in shipping weight

Made in 12- and 24-color sizes, this package effected a 20 to 30% reduction in shipping weight through elimination of the heavy sleeve and metal containers, with a saving of approximately 30% in cost. The base is formed with integral grooves which serve as brush holders, as well as individual water compartments beside each cake of coloring material.

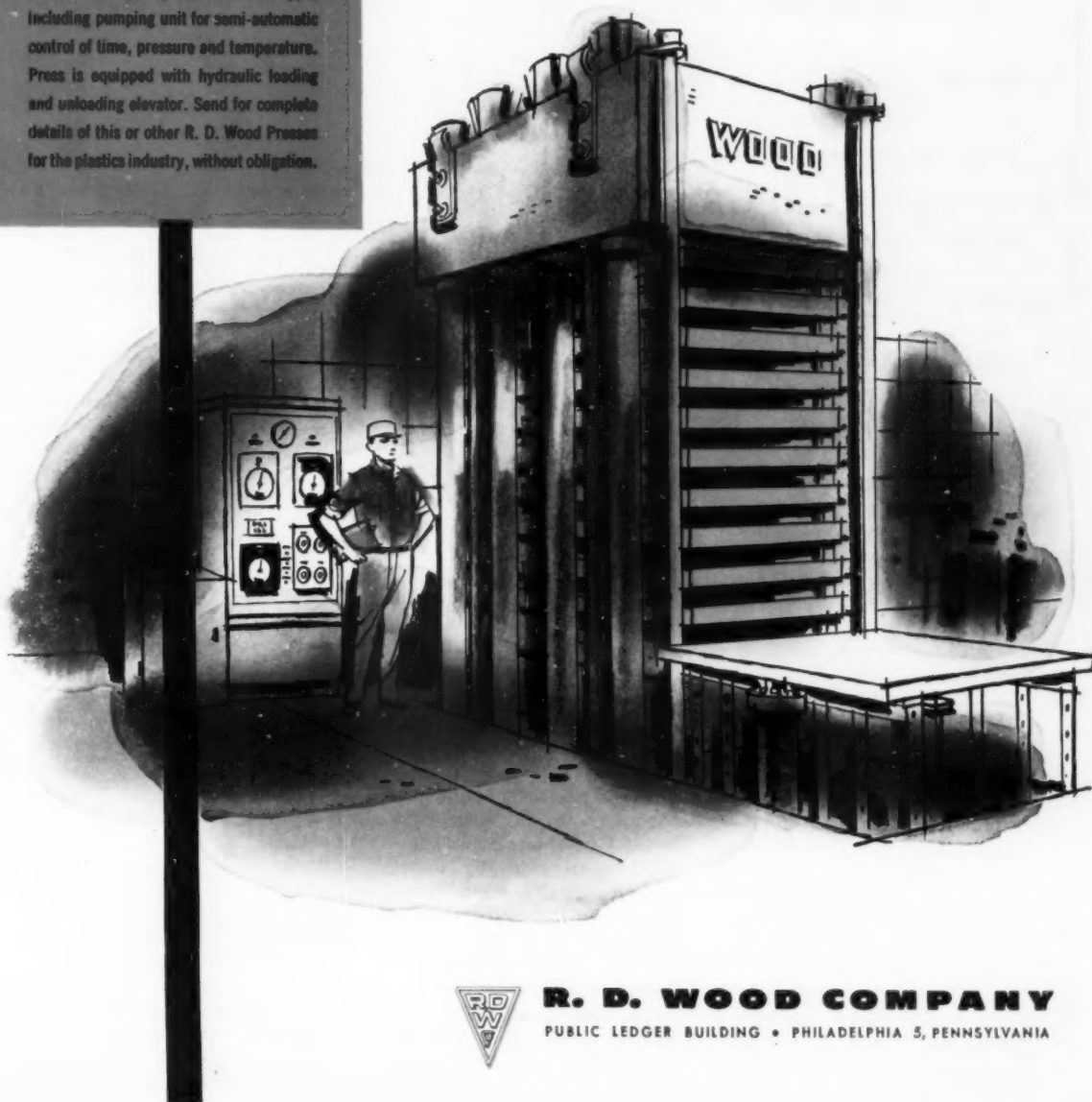
Thus, by ingenious use of formed styrene and clever redesign of the product to be packaged, this company was able to heighten its merchandise appeal while at the same time cutting cost.—End



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Surface treatment

(From pp. 101-109)

ethylene-bis-stearamide is probably related to the migration rates of these materials. An unexpected feature is the abnormally high treatability of Film A, compared with that of an equivalent film prepared from the base resin (cf. Fig. 5, Resin A). Voltages greater than about 3000 gave adhesion such that test tape applied in the standard manner could not be removed without causing film tear. The origin of this effect is at present unknown.

Treatment of Film A tends to reach the usual limiting value of around 1000 g./in. but that of Films B and B' apparently does not. A feasible explanation seems to lie in the wide melting-point difference between the additives—oleamide 155° F. (68.2° C.); ethylene-bis-stearamide 284° F. (140° C.)—and this led to experiments in which Film A' was passed over a bank of infra-red heaters placed immediately ahead of the treater. However, even though 1)

the film was heated almost to distortion point; 2) cooling was minimized by preheating all rolls; and 3) film speed was only 15 ft./min., no improvement in treatability compared with the same, but unheated, film was noted. It seems unlikely, therefore, that this general approach would offer any solution to the practical problems encountered, which, even with "in-line" treatment, are related to additive type and concentration, film speed and temperature, cooling, and position of treater(s) in relation to the extruder.

The results collected in Table III, p. 109, show that the actual slip properties of the film are dependent both on the degree and on the type of treatment.

Treatment evidently destroys, at least partially, the additive on the film surface and thus further complicates the production of film having both satisfactory ink adhesion and slip, since, as has already been shown (Fig. 8) the voltage required to achieve a given level of treatment is greatly increased by the presence of addi-

tive on the surface. The small, but useful increase of slip achieved with "in-line" treatment must mean that, when the additive eventually migrates to the surface, it functions more efficiently on the slightly oxidized and cross-linked layer, or that its equilibrium concentration is greater than on a normal polyethylene surface. In general, these results further emphasize the desirability of using "in-line" treatment whenever possible.

References

1. J. A. Boxler, S. P. Foster, and E. E. Lewis, American Chemical Society New York Meeting, Sept. 1957, Vol. 17, No. 2, p. 58.
2. A. F. Chapman, Modern Packaging 28, 117 (1955).
3. Proposed Commercial Standard for Polyethylene Film, Society of the Plastics Industry, New York, May 27, 1958, p. 6.
4. F. A. Bovey, The Effects of Ionizing Radiation on Natural and Synthetic High Polymers, Interscience, New York, 1958.
5. R. A. Hines, American Chem-

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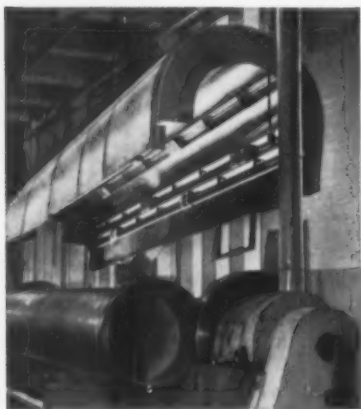
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From its unlikely beginning as a fibre-glass mat . . . to its successful operation in sub-freezing sea spray . . . the Mark 32 torpedo launcher testifies to the versatility and dependability of Chromalox electric heat. Designed and built by Apex Reinforced Plastics, division of White Sewing Machine Corp., this lightweight, corrosion-resistant launcher is now in service on Navy destroyer escorts.

Early in production, a Chromalox-heated hood is used in centrifugal molding of the launcher tubes.



First, a rolled fibre-glass mat is placed inside the mandrel, which is then engaged in spinning motion at 800 rpm. After thermosetting resin has been sprayed into the mandrel, the hood is lowered into position for

heat curing. The Chromalox type RAD Far-Infrared Heaters have a total capacity of 36,600 watts, and work reaches approximately 200°F. in about 45 minutes. The hood remains on a total of about 3½ hours, throughout the spinning operation.

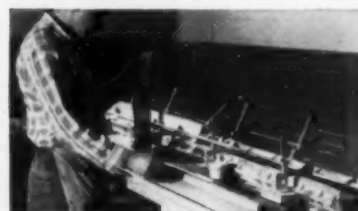
Before final assembly, each tube must have steel "nut bars" and "guide bars" cemented to its interior. (Nut bars connect the three tubes into one assembly; guide bars guide torpedoes into the launcher tube.) After these parts are cemented in place, two Chromalox Tubular Heaters wired in series set the cement.



Mounted in a frame which holds them in the center of the tube for its entire length, the 240-volt, 2750-watt heaters are controlled by a Chromalox type AR Thermostat. A small fan attached to the end cap circulates heat within the tube and eliminates condensation.

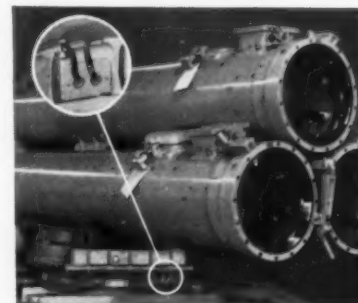
Next, four plastic quadrants are bolted to the tube interior, forming a liner to accommodate 12¼-inch torpedoes. To each quadrant are affixed two 101-inch Chromalox Flexible Woven Heaters.

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ical Society New York Meeting,
Sept. 1957, Volume 17, No. 2, p. 69.

6. A. T. Allan, *ibid.*, p. 83.

7. K. J. Rossman, *Polymer Science*, XIX, 141, (1956).

8. A. E. Symonds, U. S. Patent 2,770,609 (November 13, 1956) to Du Pont.—End

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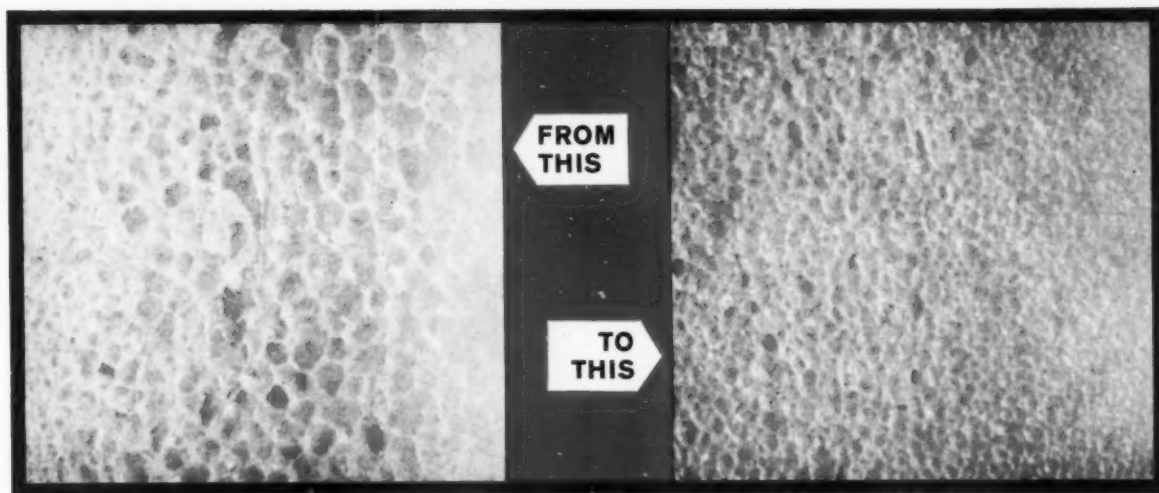
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PVF film

(From pp. 121-125)

sentially all ultraviolet light incident on the earth's surface.

PVF film is expected to be used widely as a protective and decorative surface for a great variety of materials of construction used in the building, automotive, furniture, and appliance industries. In addition to serving as a long-lived protective surface, it will upgrade materials into areas that they cannot enter presently.

PVF film is applied as a surface to sheet materials by conventional continuous laminating and press techniques (Fig. 2, p. 122). Adhesives that will provide strong, permanent bonding of the film to the substrate are under development. Recent laminations of white-pigmented Teslar film to metal on continuous commercial equipment resulted in bonds that were stronger than the film and withstood 10 hr. in boiling water without delaminating.

It is possible to provide color for the laminates by using pig-

mented film or by laminating with clear film and coloring the substrates or adhesives. Textured laminates result from embossing or forming the laminate. PVF film-surfaced metal laminates have been severely postformed by common metal-forming techniques without damage to the film or to the film-metal bond (Fig. 3, p. 124). Film-surfaced plastic laminates may be vacuum-formed readily (Fig. 4, p. 124).

Accelerated tests in the laboratory indicate that the film on metal, wood, and plastic laminates surfaced with PVF film will last up to twice as long as the unsupported film in the same atmosphere. Some test laminates have been out on test racks in Florida and Buffalo, N. Y., for as much as 2 yr. with little apparent change. In other, larger scale tests, full-sized panels of a variety of building materials surfaced with PVF film are in good shape after 12 to 18 months service on buildings. Figure 5, p. 124, illustrates one such installation. The siding on the Richmond, Va., gatehouse

(Fig. 5) was applied in August 1957. The siding is a commercial hardboard surfaced with PVF film bonded with a white-pigmented adhesive. The panels on the Buffalo plant wall, facing south, were applied between August and December, 1957. Plywood, hardboard, gypsum board, and asbestos cement board panels, surfaced with PVF film and bonded with clear and pigmented adhesives, are included in this group.

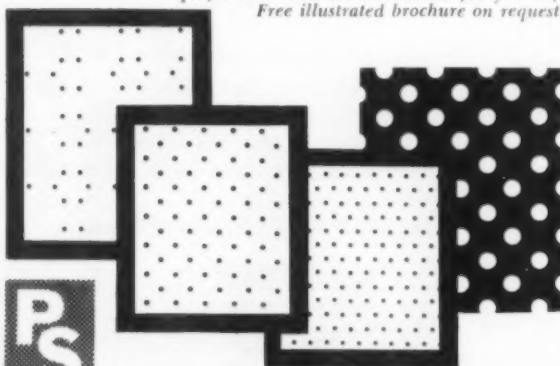
The previous discussion has dealt primarily with the properties and applications of Type 20 and Type 30 Teslar, which are now in semiworks production. Because of the versatility of this new product, it is possible to modify its properties to suit a broad range of industry requirements. One such modification, now available in experimental quantities, offers outstanding thermoformability and heat sealability with "hot-bar" methods. This experimental product is being evaluated in packaging of industrial and consumer goods, and in the thermoforming trades.—End

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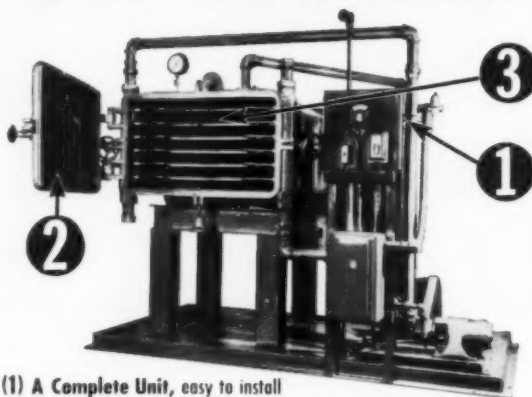
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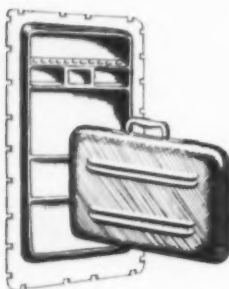
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Organosol

(From pp. 126-134)

insofar as ultimate elongation is concerned, which in the case of ultimate tensile can be more practically achieved by higher oven air temperatures with a consequent reduction in baking time.

The tear strength (Fig. 8) developed at 325° F. is about 20% lower than that developed at 375° F. This compares with only a 4% loss in ultimate tensile at these same temperatures. This loss in tear strength would have to be considered if lower fusion temperatures were required. Effects due to the loss of plasticizer at 400° F. do not show up in these data, as in the case of ultimate tensile properties.

As previously stated, the test selected to measure fusion should simulate in some way the stresses that the product will ultimately face. A secondary consideration is the reliability of the test. Obviously, a test that lacks reproducibility will not serve as an adequate control, regardless of its similarity to actual usage.

Gloss and clarity

Increase in gloss, increase in clarity, and eventually thermal breakdown are the consequence of prolonged fusion cycles or increase in fusion temperatures. This general rule can be applied to virtually all plastisol and organosol work. In addition to baking conditions the selection of resins, plasticizers, and stabilizers will influence these properties.

In the event a clear organosol film is used where it is not in direct contact with the viewed surface, the selection of stabilizer has been found to be of particular importance. Generally, for best clarity the barium portion of a barium, cadmium system is kept to a minimum (8). Specific recommendations for high-clarity stabilizer systems are available from most any of the stabilizer manufacturers.

When the organosol is coated directly on the viewed surface, as in the case of organosol coated flooring, the selection of stabilizer for clarity is somewhat less critical. However, gloss, heat stability, and freedom from haze or stain-

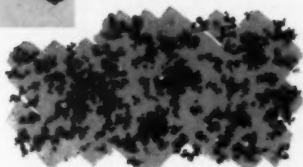


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ing are important in this application.

It has been observed that the use of wetting agents, when used for viscosity reduction, also aid in improving clarity.

Typical laboratory formulation

A coating application required a degree of hardness in the organosol top coat which could be met by lowering the plasticizer level to 25 P.H.R., using DOP and an epoxy plasticizer. A film thickness of about 4 to 5 mils was also required and application of the organosol was to be accomplished by either knife or reverse roll coating, both of which are high-shear techniques. With these requirements a starting formulation was selected consisting of 25 parts of plasticizer, a suitable stabilizer system, as well as a diluent (Recipe V, Table III, p. 132).

Castings on paper, using the coating device, shown in Fig. 10, p. 134, were used to simulate results obtained with production equipment. Even though this device is hand operated, relatively high shear rates can be developed; these rates are dependent upon the speed with which the paper is drawn through the rolls and the clearance between the paper and roll (5).

The results of coating with Recipe V and its modifications are shown in Table III. The amount of force required to pull the paper through the coater when applying Recipe V was extremely high. This high drag resistance would in a production setup undoubtedly tax the wind-up equipment and prevent the coater from operating with any speed.

In addition to high drag resistance, coating with Recipe V resulted in severe flow lines or striations. These flow lines did not flow out between the time the film was cast and fused in the oven.

Both high drag resistance and poor flow out can be related to a coating material's high- and low-shear viscosities, respectively (9). Consequently, both Severs (high shear) and Brookfield (low shear) viscosities were obtained on Recipe V and listed in Table



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III for the purpose of correlating formulation adjustments, viscosity properties, and observations of laboratory castings. Both the Severs and Brookfield data on Recipe V were high, thus correlating with the observation made on the laboratory castings.

In order to reduce both high- and low-shear viscosities, further dilution with the volatile diluent, as illustrated in Fig. 2, was indicated. Recipe V1 (Table III) contains 3 P.H.R. additional diluent. This resulted in a lowering of the drag resistance to an acceptable level and can be related to the significant drop in Severs viscosities resulting from this adjustment. However, the flow lines remain, in spite of the reduction in Brookfield viscosity also. In order to reduce the Brookfield or low-shear viscosity even further without utilizing additional diluent, the use of a wetting agent, as illustrated in Fig. 6, was necessary.

A 1% addition of PEG400MO, Recipe V2 (Table III) resulted in a sharp reduction in Brookfield

viscosity with little change in Severs viscosity. With the sharply reduced Brookfield viscosity, castings of Recipe V2 were found to be quite satisfactory with both low drag resistance and excellent flow out.

Thus, an organosol recipe for plant trial was provided by the use of this relatively simple laboratory evaluation. Also provided were high- and low-shear viscosity data to be used as a guide in setting up suitable controls for production batches.

Applications for organosols

One of the largest uses of dispersion resin employing the organosol technique lies in the flooring field. Several firms are manufacturing an organosol-coated asphalt-saturated base material as an improved enamel-goods-type floor covering. Vinyl-coated paper and fabric for luggage and window shades require the use of low plasticizer level, organosol formulations in order to develop sufficient hardness. Adhesive bandages in different

colors for use in the home are made by casting organosols on a paper or metal carrier from which the fused film is subsequently stripped.

In the future, other fields will no doubt feel the impact of the organosol technique. For example, the spread coating of plastisols on metal could conceivably give way to the use of the organosol technique for improved wear resistant surfaces that are essential to building partitions, metal furniture, and for various postforming operations. The use of organosols as an industrial finish is expected to receive renewed interest when the compounders become aware of newly developed formulating techniques.

Because of the inability of many non-toxic plasticizers to take heat as severe as would be experienced by a calendered film, the casting of low plasticizer, non-toxic films from organosols, using these special plasticizers, may prove to be a satisfactory technique. The only heat required here is for fusing the film and this can

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be kept to a bare minimum, since elevated temperatures for extended periods are not required for forming the film of sheet.

The use of low plasticizer level organosols in coating paper for stiff book covers may replace pyroxylin in this application. Another use for organosols may lie in the reinforcement of thin carbon paper and the heat-sensitive paper used in the various office duplicating processes.

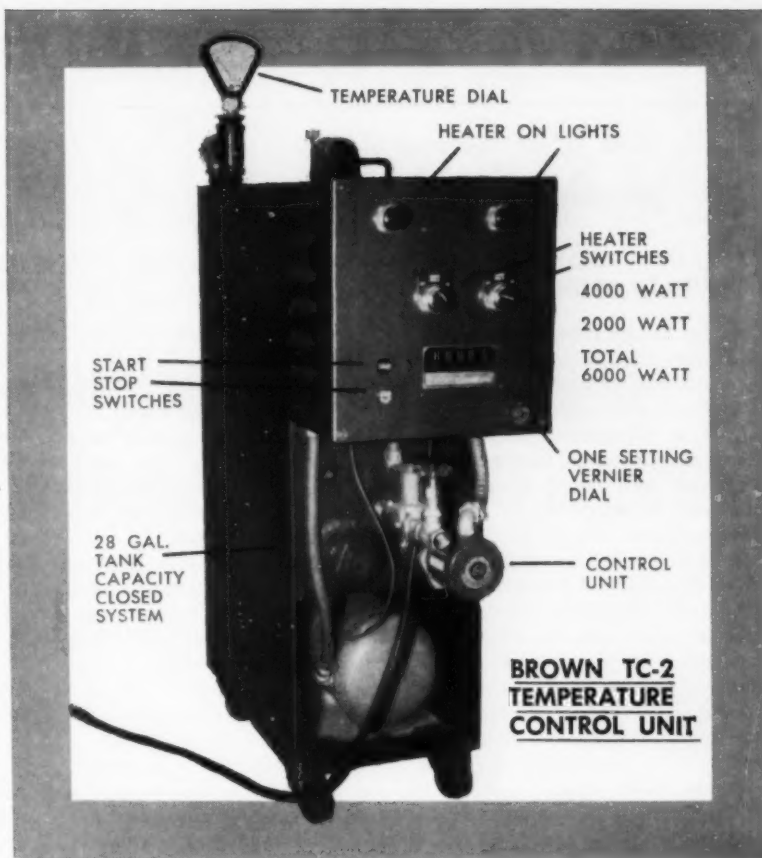
The development of rheologically satisfactory dispersion resins accompanied by the use of the organosol technique could open up new vistas in the wire coating field. The use of organosols would particularly apply to the high speed application of semi-rigid coatings on wire with plasticizer levels in the range of 30 P.H.R.

The metal decorating field, using varnish type resins applied by roller coating, may also find low viscosity organosols well suited to their needs. These are but a few of the present or future organosol applications.

The help and advice of Ivan Mankowich, Manager, Marvinol Development, and other members of the Section are gratefully acknowledged.

References

1. Modern Plastics 36, 82 (Jan. 1959).
2. "Vinylite resin dispersion coatings," Union Carbide Plastics Co. (1949).
3. "Organosol formulation," E. R. Nielsen, Modern Plastics 27, 97 (May 1950).
4. "Formulation studies of vinyl resin organosols," G. M. Powell, et al. Modern Plastics 28, 129 (June 1951).
5. "Rheology of plastisols," A. C. Werner, paper presented at S.P.I. Film, Sheeting and Coated Fabrics meeting, Dec. 1956.
6. "High-shear-rate rheological properties of plastics," A. C. Werner, MPI 34, 137 (Feb. 1957).
7. "Shell special products," Shell Oil Co.
8. Harshaw Vinyl Stabilizer Bulletin (April 1957).
9. "A method of measuring brushability, sagging, and flow-out of paints," Official Digest, Federation of Paint & Varnish Prod. Clubs (Apr. 1953).—End

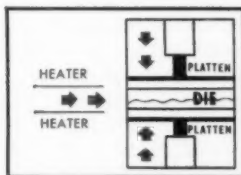


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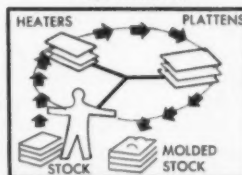
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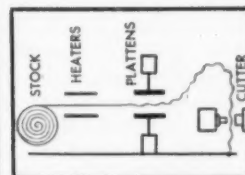
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THE PLASTISCOPE*

News and interpretations of the news

By R. L. Van Boskirk

Section 2 (Section 1 starts on p. 39)

July 1959

Penton to compete with metal

Hercules has let it be known that its Penton resin is now available in reasonable quantities from a semi-commercial operation. Penton is a chlorinated polyether thermoplastic derived from pentaerythritol with better heat and chemical resistance than most thermoplastics. It helps to fill the gap between unplasticized polyvinyl chloride and fluorocarbons (Teflon and Kel-F) in performance properties and is emphasized particularly as an anti-corrosion material because of its chemical resistance. It can be injection or compression molded, extruded into pipe, film, or sheet, on conventional machines, and is amenable to fluidized bed coating.

Selling price is currently \$3.50/lb. base price. At this price it is a lower cost raw material than most alloys used for corrosive prevention. At 17.5¢ a cu. in., it is competitive with stainless steel at 23¢, nickel at 38¢, Hastelloy C at 80¢ and the fluorocarbons, Teflon at 32 and Kel-F at 59 cents.

Penton is used in combination with Teflon in valves, where the latter material's cold flow is often desirable in diaphragms or seating rings that fit into the valve proper.

Penton will melt at 365° F., has an operating temperature range of from 220 to 280° F., depending upon environment. For example, if the plastic part is exposed to a less than 60% sulphuric acid concentration, it will withstand a temperature of from 220 to 280° F. One manufacturer recommends working pressures on its solid Penton valves of 135 p.s.i. at 100° F., which is about the same as Type I PVC and perhaps 15° higher than polypropylene. However, these valves are recommended for 60 p.s.i. working pressure at 220° F., which is much

higher than polyvinyl chloride and polypropylene.

Penton's corrosion resistance is in the same range as nickel and better than stainless steel or most alloys. About the only usual chemicals that affect it are strong solutions of nitric, sulphuric, and hot ethylene dichloride.

This new material exhibits very little shrink—about 0.003 to 0.008 per inch of width which compares to polystyrene, one of the lowest, at 0.005. It doesn't warp or swell after removal from the mold, according to Hercules, and there are not likely to be built-in stresses because of its crystalline structure. It can be used for close-tolerance molding, since the low initial shrinkage gives consistent dimensions and is practically stress free, and, of course, requires no machining or assembly operations for valve making.

Five years have been spent in developing products made from Penton, such as valves, valve linings, pipe fittings, pumps, tank linings, meters, and extrusions around inserts. A 6-part Chemtrol threaded valve molded to tolerances that allow a tight fit is a prize exhibit at the Hercules plant. One company has already used hundreds of molded Penton valves with very few rejects. Penton pipe is expected to be a large field and lined or coated metal pipe is on the way. No solvent has been found for joining pipe sections, so it must be flanged or heat welded.

Extruded sheet is used for tank linings and other purposes where sheet is practical. A polysulfide epoxy adhesive is one adhering agent. The sheet surface is first treated with chromic acid before the adhesive is applied. Sheet can be welded without stress since any stress in the weld relieves itself as the material crystallizes—a rather unusual property in

plastics. Fluidized bed coating with Penton on metal valves is said to be highly practical. One large company has produced coated valves for over a year.

Combining development and sales

A new set-up that will help to coordinate the development and sales of plastics products companies has just been arranged between Moldings & Extrusions, Inc. (Moldex), Wauregan, Conn., and Garth & Associates, Summit, N. J.

Garth & Associates was organized by Ralph E. Gesell, formerly of Du Pont and Spencer Chemical, together with E. D. Garth, a market consultant and former VP of C. R. Bard, a pharmaceutical house. G & A will operate as a sales representative but will concentrate on developing new plastics products that can be developed in the plants it represents. Particular attention will be given to nylon applications, a field in which Mr. Gesell has specialized for several years.

Among these products is oriented nylon strip for conveyor and transmission belting. Nylon is the core material for such belts, and, because of its thinness and strength, will reduce the number of plies required. Furthermore, it does not stretch after long wear and has a tensile strength of around 40,000 p.s.i., according to Mr. Gesell. Unoriented nylon has a good tensile strength of around 10- to 11,000 p.s.i., but this strength is combined with a high percentage of elongation.

Proponents for nylon film claim that it will be slightly less costly than polyester film because it has a higher yield. Some of its properties are particularly attractive. It can be heat-sealed readily; when coated with PE or saran as a barrier material, it can be used for food packaging. For (To page 176)

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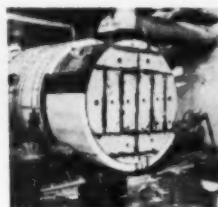
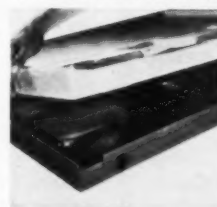
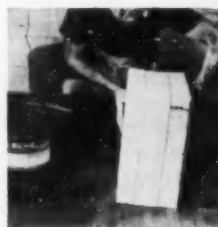
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Either way, they enable you to overcome the key problems involved in bonding these plastic foams to themselves or to metals, wood, cement board, or other materials, since all feature high strength, moisture-resistance; resistance to odor absorption and transmission (essential in refrigerator work), resistance to freezing temperatures; and long-time aging properties in the completed bond.

WHY SOLVENT-FREE EPOXIES?

You wouldn't suppose heat resistance mattered since the foam won't stand too much, itself. However, there are some installations (mostly military) where a void-filling adhesive must resist "creep" at temperatures up to the foam's softening point ... and under structural loads, at that! For such applications, most foam manufacturers' literature recommend a 100%-solids epoxy such as BONDMASTER M664 or M688.

For technical data and samples of the rubber-resins or the epoxies tell us about your specific problems.

THE PLASTISCOPE

(From page 174)

large item packaging, such as blankets, a $\frac{3}{4}$ -mil nylon film could equal 3- or 4-mil PE in strength properties. It is also said to be flame resistant and self-extinguishing.

Another product available from G & A is Nygar, a non-toxic adhesive for nylon that can be applied with little pressure, no heat and a 3-min. curing period.

Officers of Moldex are John E. Holt, president; Carl R. Pite, executive VP; Harold E. Schlener, VP-engineering; and Randolph Schlener, VP-manufacturing. Mr. Holt served as president of Danielson Mfg. Co. until it was sold to Nicholson File Co. in 1957. His company specialized in precision nylon molding. Moldex has also acquired General Molding Co. of Great Neck, N.Y., and will move this operation entirely to Wauregan, Conn.

Atlas' new polyester resin

A new liquid polyester resin, with certain end-use characteristics approaching those of epoxies, has recently been developed by Atlas Powder Co., Chemicals Div. Called Atlac L-382-13, the resin is suggested particularly for the fabrication of chemical-resistant tanks and in applications where corrosion may be a factor, such as textile and pulp and paper equipment.

Based on a bisphenol derivative reacted with fumaric or maleic anhydride, the resin is different from other available polyester resins, both in chemical composition and use characteristics. The special properties of Atlac L-382-13 become important in applications where conditions such as elevated temperature or corrosion cause physical, chemical or electrical failure in normal polyesters. In such cases, Atlac L-382-13 will often furnish the required properties, eliminating the need for the more costly epoxy materials.

According to the company, use characteristics of Atlac L-382-13 are as follows:

Superior resistance to water,

acids, and alkalis, particularly at elevated temperatures.

Higher heat distortion temperature (285° F.) than conventional polyesters. Excellent hot-strength will facilitate part removal from the mold.

Excellent electrical properties, particularly after exposure to high humidity conditions.

Lack of styrene after-odor.

Unique temperature-viscosity-gelatin characteristics make Atlac L-382-13 an excellent material for preparing polyester molding compounds. The resin is especially effective in assisting uniform dispersion of the fiber reinforcement throughout the molded part.

Tolerance of more styrene than conventional polyester resins without a loss in physical properties, which allows a reduction in costs.

A specific gravity 5 to 10% lower than conventional polyester resins which decreases the final cost of the molded part.

Pipe and fitting news

Rigid PVC pipe and fittings have replaced all the copper-nickel piping used in a Diesel-generator salt water cooling system on a man-made radar island 110 miles off Cape Cod. Galvanic corrosion of the copper-nickel-alloy piping threatened to cut off the power to the radar station. Normal impact 4-in. unplasticized piping joined with unplasticized fittings and flanges, injection molded by Tube Turns Plastics, Inc., was used for this application. The installed cost of the new piping was about half that of the copper-nickel alloy, which had a life expectancy of only 18 months, whereas the plastics pipe shows no sign of corrosion after more than two years.

PVC water main. The first major installation of rigid PVC underground water main in England has just been completed, although this material has long been accepted in other parts of Europe. A total of 10,000 ft. of 4-in. pipe was used, installed by three men at the rate of 1500 ft. per 8-hr.

working day. The pipe was made by Chemidus Plastics Ltd., from a formulation containing polyvinyl chloride supplied by British Geon Ltd.

Extruded 12-in. diameter Schedule 40 and 80 pipe has been added to the line of rigid UPVC pipe made by Joseph T. Ryerson & Son, Inc., Chicago, Ill. This size is also supplied in thin wall or Schedule A, which should be particularly useful for round duct work in the sheet metal fabricating trade, and in other applications where a high degree of acid fume and corrosion resistance are required.

High-density PE, supplied by Koppers Co., Inc., is used in hubbed perforated drain pipe fabricated by Pyramid Industries, Inc., Erie, Pa. The hubbing is an integral part of the pipe, and eliminates the need for a separate coupling. This pipe is also available in double-hubbed lengths and is approximately one-third the cost of cast-iron pipe. Water absorption of this pipe is said to be practically non-existent; and its crushing strength is reported to be well over 800 lb. with no fracture. The pipes are available in 2-, 3-, and 4-in. diameters.

High-impact polystyrene conduits, designated Dur-X, are made in 2-, 3-, and 4-in. sizes by Franklin Plastics, Inc., Franklin, Pa. Sections up to 30 ft. in length are joined by solvent-welded connections applied at the site.

Teflon sealer. A pipe joint sealer in tape form made from Teflon is said to seal all types of threaded connections under the most difficult service conditions. It will safely handle most industrial acids, corrosives, caustics, hydraulic fluids, and aromatic fuels. It is also recommended by the manufacturers—Crane Packing Co., Morton Grove, Ill.—for alkalis, toxics, biological and gas service. Temperature range is from -250 to +500° F., pressures to thousands of pounds.

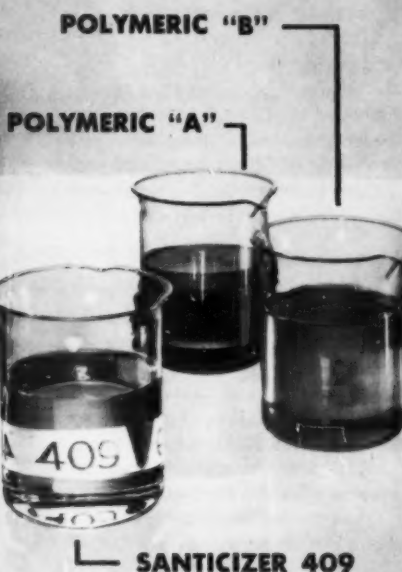
Valves. A line of valve trim and diaphragm protectors made from PVC is now available from J. E. Lonergan Co., Philadelphia, Pa. Walworth Co., New York, N. Y., introduced a 3-in. PVC Y-Globe valve, check valve, and strainer. PVC (To page 178)

Monsanto's new SANTICIZER 409 gives "high-priced" properties at the lowest cost of any polymeric plasticizer!



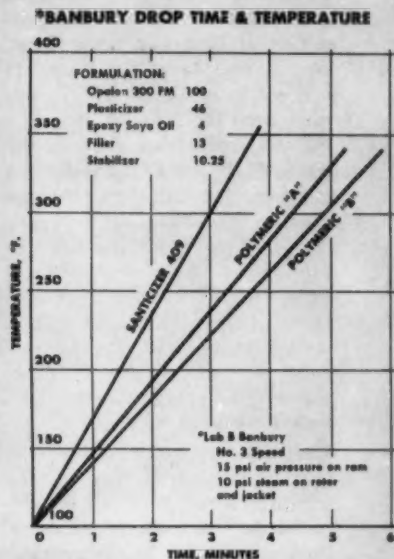
"Permanent" Benefits

To end summer "fog-up" on car windows from plasticizer volatilization (the most urgent problem confronting vinyl upholstery and coating producers), SANTICIZER 409 offers the best, lowest-cost answer. Simulated service tests prove it stays in the product longer than many higher-priced polymers. SANTICIZER 409 is less volatile, does not migrate or exude—even in high humidity—as do many other polymeric plasticizers. Also, it is more resistant to extraction by soapy water, alkalies, solvents and oils, and has superior electrical properties.



Lighter Color, Lower Odor

Compared to two commercial polymeric plasticizers (above), SANTICIZER 409 has a lighter, clearer color and far less odor. Its good heat and light stability help finished products retain their true colors, plasticity, attractive appearance and other important physical properties. SANTICIZER 409 contains no flocculent matter or sediment to cause spotting in thin films, transparent sheeting and similar products. Its high purity contributes to excellent electrical properties in vinyl insulating compounds.



Fastest Fusion

SANTICIZER 409 speeds the fusion of vinyl compounds faster than many other polymers. Its high solvating power, low viscosity and plasticizing efficiency may cut your processing time, or improve your compound's physical properties within your processing temperature limitations. SANTICIZER 409 mixes readily with a variety of monomeric plasticizers and is highly compatible with cellulose acetate butyrate, nitrocellulose, polyvinylidene chloride and PVC.

SANTICIZER: Monsanto T.M., Reg. U.S. Pat. Off.

For Technical Bulletins, Use Coupon

- If you now use or can use a polymeric-type plasticizer, you can't afford *not* to evaluate new SANTICIZER 409. Use-rated and job-proved, it can give you exclusive advantages at *lowest cost* in products such as: electrical-grade plastisols; coatings for moisture and corrosive-fume protection of dishwashers, ventilator ducts and similar products; long-service profile extrusions such as refrigerator gasketing; coated fabrics, film and sheeting, adhesive-backed tapes and free films.

Write on your company letterhead for a sample of SANTICIZER 409 and compounding help from Monsanto's Plasticizer Council.



Monsanto Chemical Company, Organic Chemicals Division
Plasticizer Dept. 4, St. Louis 66, Missouri

Please send me the ☐ Technical Bulletin on
SANTICIZER 409

☐ Research Report on "Fogging
in Automobiles"

Name.....

Company.....

Address.....

City..... Zone..... State.....

THE PLASTISCOPE

(From page 176)

valves are recommended by Walworth for pressures of about 150 p.s.i. at 72° F.

A PVC waterstop, featuring an angle-ribbed design which provides greater holding power when embedded in concrete, has been introduced by Rex Corp., subsidiary of American Enka Corp., West Acton, Mass. These stops are said not to crack at -30° F., nor when bent 180° at -20° F.

B-I-F Industries, Inc., Providence, R. I., has added to its line of insert-type Dall Flow tubes for primary flow metering to handle line sizes up to and including 48 inches. The tube is made of polyester or epoxy resins reinforced with fibrous glass, and has a metallic throat lining.

Pulverizing plastics with liquid nitrogen

Most thermoplastics can be pulverized with liquid nitrogen, and mixtures with fillers can be prepared to various specifications. Pulverizing with liquid nitrogen is indicated where 1) the materials might otherwise degrade during pulverizing, 2) a reactive compound would be converted because of heat elevation, and 3) where the materials will soften or melt at a low temperature.

A typical example is sponge Teflon for use in filtration, electronic, and mechanical applications offered by Liquid Nitrogen Processing Corp., Chester, Pa. The product is inert to nearly all chemicals at temperatures up to 500° F.; it has low dielectric loss, is unaffected by humidity, which makes it useful in high-frequency equipment. As a coaxial spacer it allows breathing. It offers possibilities in acoustical insulation and vibration absorption if conditions require the inertness of Teflon. As a bearing, the process structure offers possibility of lubrication with oils or other liquids or of cooling with air and liquids. The product can be varied by introduction of reinforcing or modifying agents such as carbon, graphite, quartz, glass, calcium fluoride, boron. Due to its

porous nature, air, liquids or other gases can be passed through it to help control temperature.

LNP has also developed a line of purified colors particularly for Teflon that are used in Teflon tape and other electrical components or paste extrusions.

Most of the processing by LNP is done on a service basis, with the customer supplying the materials and specifying type product desired, but LNP maintains inventories of fillers, pigments and Teflon powders and dispersions for convenience to customers.

Light-stable polystyrene

Suppliers have been working to improve the light stability of general-purpose polystyrene for at least 10 years. Resins of this type have been offered several times, only to be withdrawn because they did not fulfill expectations. This situation naturally had an adverse effect on the light diffuser market among others. Now several new formulations are being offered, which are claimed to be adequate.

Sheffield Plastics supplies a coated polystyrene, which is pointed directly at the light diffuser market where it is reportedly finding acceptance in large volume quantities.

Newest of the light-stable polystyrenes to be offered are Dow's new Styron 672 Verelite and Styron 673 Verelite, which are asserted to be suitable for fluorescent light fixtures, light grids, and folding curtains. Verelite 672 is designed specifically for injection molding and 673 for extrusion. The price for 20,000 lb. and over for crystal is 23¢ a pound. Colors are 27¢, with VIP (Volume Inventory Production) discounts available if the customer can qualify for colors available under this pricing system.

Videne for furniture

A home portable bar and room dividers, which feature Goodyear Tire & Rubber Co.'s Videne polyester film, are now in volume production by The Saginaw Furniture

Co. A 2-mil clear embossed Videne film laminated to black rigid PVC over a wood base is used in these first commercial furniture applications. The laminate was produced by Laminated Plastex Co., Springfield, Ohio.

Utilization of the polyester film for bar tops and trays reportedly reduces finishing costs by approximately 35%, through elimination of the conventional time-consuming spray or brushed lacquer methods employed by the furniture industry. According to Saginaw, the inherent decorative and protective qualities of the film more than double the utility value of the furniture pieces to the consumer, because Videne is impervious to most household stains, alcohol, water, chipping, and has unusually high abrasion resistance.

Saginaw believes that the film can be advantageously used on all wood surfaces, and the company intends to introduce a consumer item finished completely with Videne.

Progress in urethane foams

Flexible and rigid urethane foams continue to find new applications as new processing techniques are evolved. Here are some of the latest developments.

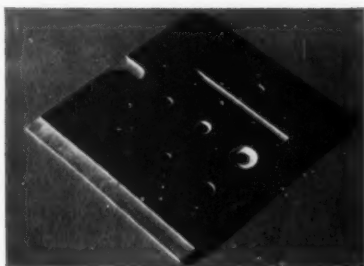
Molded seating. Almost 2000 urethane foam topper pads for the automotive industry are supplied daily by Reynolds Chemical Products Co., a division of Stubbins Greene Corp. The company has now also started pilot plant production on a molded automotive seating unit where the steel springs are inside the foam cushion, said to make a more economical and comfortable seat than the traditional construction, where the cushioning rests on the spring base.

Reynolds maintains three foam production lines at its new plant near Whitmore Lake, Mich., one line at its Ypsilanti, Mich. plant, and intends to add a fifth production line in the near future.

Pipe insulation. Pre-molded rigid urethane foam insulation, designed especially for applications down to -300° F., is being marketed by Baldwin-Hill Co., Trenton, N. J. According to the company, the (To page 180)

PRODUCT-DESIGN BRIEFS FROM DUREZ

- Fire-retardant electrical laminates
- Plastic for wire-spring relay



Plain ...



or fancy

This electrical laminate deserves more than a casual look, if only because there are so many things you can do with it.

Made of glass-reinforced polyester, it comes in sheets or molded shapes that embody three useful attributes. First, they are strong enough to play a structural role in heavy-duty electrical equipment. Second, they retard fire. Third, their excellent electrical properties change but little at 100% relative humidity.

The shapes you see here are made with Hetron® polyester resin by Fiber Glass Industries, Inc., and are inherently flame-retardant. Hetron burns only in the immediate vicinity of an arc or hot flame, and quickly extinguishes itself when the heat source is removed. Thus in case of a burnout, damage is usually confined to a small area, with minimum effect on mechanical strength of the material.

Generally, Hetron laminates exhibit very low loss factor over a wide range of frequencies. Dielectric constant, for a 1/8-inch glass-mat laminate containing 35% glass, hovers as low as 4.25.

Arc resistance of such a laminate is on the order of 110 seconds.

Do these traits suggest a way to achieve long life in equipment handling medium and high voltages? We'll gladly send you the complete data file on Hetron resins, and names of skilled fabricators who can supply laminates and molded shapes to match your ideas.

Building a better relay

Often it isn't enough to design a product. You may also have to find a way to make it.

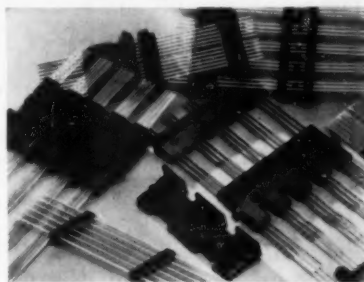
Such was the case when engineers at Bell Telephone Laboratories developed for Western Electric Co. a new relay, basic component of telephone switching equipment.

In one swoop the new design—called the wire-spring relay—promised to reduce manufacturing and maintenance costs, work better, and last longer than its predecessor. However, this involved something that had never been done—molding straight wires into small plastic blocks automatically.

Before it could be done, Western Electric engineers had to:

1. devise a way to straighten small-diameter spooled wire;
2. feed the straightened wire into a mold in precisely spaced groupings;
3. embed the wires without shift in a molding compound that would insulate them and hold them securely for a relay lifetime of one billion operations or more.

Early in the game it became apparent that this was a job for phenolics. A major requirement was fast cure. Another was batch-to-batch consistency of the molding material. At fast cure speeds, a 10% variation in curing time can mean as little as 1.2 seconds' leeway between a reject and a good piece.



Volume resistivity was important. Could a Durez material handle the job?

Yes, one could. The wire-spring sub-assemblies you see here are made with it. They are being produced at low cost to the required accuracy in fully automatic molding machines. They prove the ingenuity of the men who developed this new concept in telephone switching—and the versatility that you command when you design with Durez materials.

To get a better idea of how far this versatility goes, check the coupon for more information. Booklets are available describing a range of properties you can get from typical Durez materials; give helpful suggestions on where to use them.

For more information on Durez materials mentioned above, check here:

- ☐ Data on Hetron, including fabricator lists (50-A)
- ☐ Durez molding compounds (14 page booklet)
- ☐ General information on Durez Products (Bulletin 400)

Clip and mail to us with your name, title, company address. (When requesting samples, please use business letterhead.)

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We are also happy to announce improvements in our new Spooling - or Level Winding - Machine.

117D - Spools 24" dia. 12" face
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(From page 178)

material has a K factor of 0.096 at a mean temperature of 0° F.—less than one half of other industrial insulation which is suitable for low temperature use. This permits material savings, and the company reports that cost of installation of this material averages about 30% less than with competitive materials.

Aids foam users. A program for exploring potential uses for urethane foam and for testing applications for manufacturers and fabricators, has been established by Nopco Chemical Co. The company has created a custom foaming operation which will use the facilities of the Plastics Div., at North Arlington, N. J., and a field service team, which will go to any part of the country to spray or foam at the customer's location. The main function of the team is to test practicability and economy of spray coatings, establish techniques, and explore markets. Nopco will also equip and train teams for other organizations.

Granulated foam uses. Inexpensive protective packaging made from chopped urethane foam which is bonded to form a uniform product, is offered by Henry B. Katz Industries, Newark, N. J.

Another use for granulated foams of various types is as a soil conditioner, and as retainers for liquid or organic fertilizers. Similar applications envisioned by the developers, AgraFoam, 101 Euclid Ave., Somerset, Mass., include the use of foam as a retainer for insecticides, fungicides, etc., and as a soil-less medium for hydroponically grown plants.

Grace Co. buys Hatco

The acquisition of Hatco Chemical Co. by W. R. Grace & Co. has created as much "buzzing" in the plasticizer industry as any buzz in the last year or two—and there have been plenty of buzzes in that turbulent industry. But most of them have been caused by complaints concerning price juggling and lack of profit. The trade is still busy trying to guess just how the entry of Grace into the plasticizer market will affect an overcrowded field, although the com-

pany's press release stated that "there is no intention of changing its (Hatco's) present management and policies."

Grace acquired Hatco in exchange for 126,000 shares of Grace common stock, which amounts to about \$6 million at present stock prices. Hatco was founded several years ago by William Hackman, who was once in charge of plasticizer allocations for WPB during World War II, and then served with Drew & Hardesty before establishing his own company. The firm produces phthalate and sebacate plasticizers and synthetic lubricants for jet engines.

Epoxy molding compounds

Three new epoxy molding compounds, which are said to release as easily as phenolic, are now available from the Fiberite Corp., Winona, Minn. Type 2068 is a mineral-filled general purpose resin with Izod impact strength of 0.35 ft.-lb./in. of notch. This compound molds at 100 p.s.i., and is a powder similar in appearance to general purpose phenolic resin.

Type 2175, a non-impact type molding compound, is intended for the molded coating and encapsulating field. This material compression molds at about 50 p.s.i., and can be easily transfer or plunger molded into and around a large variety of objects. Transfer molding pressures are about three times higher than compression molding pressures. This material is also a powder.

Type 2185, a Dacron-filled epoxy molding compound, is intended for impact applications. The material is flaky in appearance and has an impact of 0.8 Izod (notched).

According to the company, these compounds generally require extremely low pressure for molding; they retain their properties; have excellent dimensional stability; water absorption of 0.09%; and heat resistance of 500° F.

Nylon extrusions

Continuously extruded profile shapes of Nylatron GS, a molybdenum disulphide filled nylon, are now available from The Polymer Corp. of Pa., Reading, Pa. The extrusions are used for runners, conveyor or channel

tracks, sash linings, and general sliding contact or protective wear surfaces in the machinery, automotive, aviation, or architectural fields.

Filled nylon profiles are said to reduce wear and friction on sliding surfaces.

Pressure tubing. A new flexible polyamide tubing which can be used continuously in an oxidizing atmosphere at temperatures up to 225° F. is also available from the company. The new tubing, called TR, supplements the presently available Nylaflo pressure tubing, which has not been recommended for continuous use above 180° F. Grade TR can be exposed intermittently to temperatures as high as 300° F., the company states.

Studebaker buys Gering

Purchase by Studebaker-Packard Corp. of 100% of the stock of Gering Products, Inc. has been announced by the two companies.

Gering Products, Inc., Kenilworth, N. J., is a producer of plastic compounds, polyethylene film, and plastic garden and industrial hose.

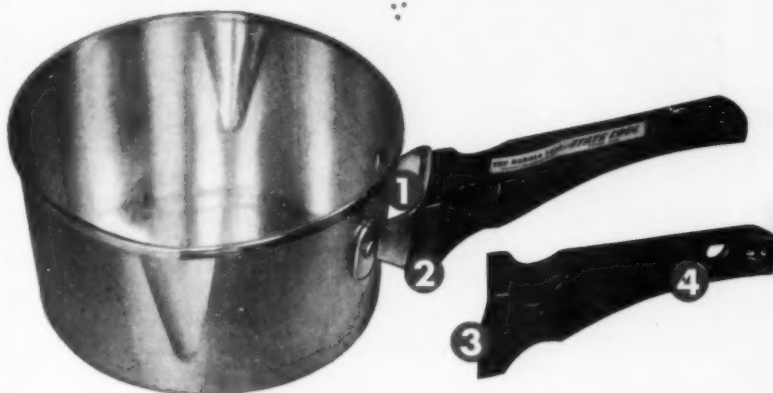
Gering Products will be operated as a separate division of Studebaker-Packard. It will be managed by Larry Gering and Herman Gering, who founded the company.

Silane for bonding

Ready reaction with both organic and inorganic materials to unite them in a strong, durable bond is claimed for Dow Corning Corp.'s new amino-silane chemical identified as Dow Corning Z-6020.

Glass or mineral wool insulation, for example, is claimed to have greater resiliency, heat stability, and resistance to moisture when Z-6020 is added to the binder resins. It is said that addition of Z-6020 also produces phenolic, epoxy and melamine glass-cloth laminates with higher flexural strengths and improved dielectric properties. Glass fibers pretreated with amino-silane can be dyed with a variety of standard wool dyes and the chemical is also a corrective diluent and curing agent for epoxy resins. Concentrations of from (To page 182)

Triple Problem Solved by Watertown Design Engineer



Teamwork Produces "Handle that Stays Cool"

When the Enterprise Aluminum Co. of Massillon, Ohio recently brought out a new line of saucepans, they wanted a plastic handle that would: (1) stay cool, (2) be light weight and economical, (3) have strength and rigidity.

The Watertown design engineer worked directly with Enterprise engineers. Together they created a phenolic handle, mounted it on a

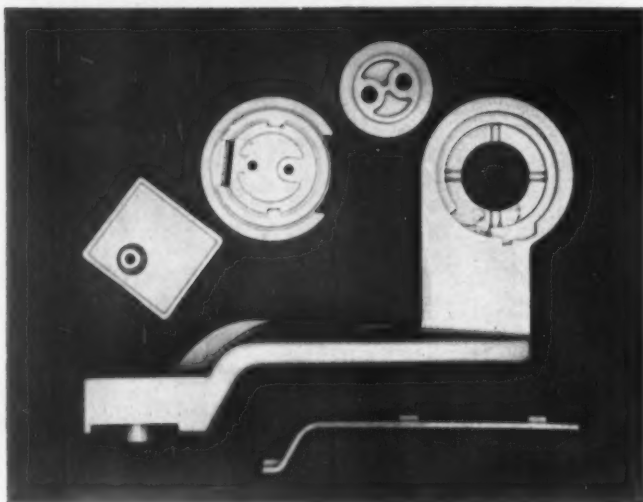
- 1** protruding aluminum bracket to keep it away from gas flames. The handle base has
- 2** wide bearing points on the pan bracket, to provide rigidity, and is separated by an
- 3** air space to thwart heat conduction.
- 4** The handle is channel-shaped for strength and heat dissipation.

This design gave Enterprise something to shout about — a handle so radically improved that it carries a special point-of sale advertising sticker reading: "The Handle That Stays Cool."

All the objectives of the Enterprise Aluminum Co. were accomplished. You, too, can secure the answers to your trickiest plastics problems by contacting . . .

THE WATERTOWN MFG. CO.
1000 ECHO LAKE RD., WATERTOWN, CONN.

POLAROID specified dimensional accuracy



and got it from CONSOLIDATED

Both dimensional accuracy and fine appearance were essential requirements in the production of this camera flash attachment for Polaroid. Naturally, mold planning and construction were of utmost importance in such a critical job. Precision and timing had to be built into the mold design. Three different molds were necessary to produce the five separate pieces which form one synchronized unit.

In assembling the unit, all parts had to be kept in perfect alignment; no warpage or twist was permitted. For appearance's sake, it was necessary to locate mold parting lines on the natural edges of the pieces.

This flash attachment unit represents the type of molding challenge Consolidated welcomes. We appreciate the opportunity to quote on any molding — complicated or simple.



The Polaroid Bounce Flash Bracket (Model #292), with swivel-type flash gun clip, permits the taking of both horizontal and vertical pictures without removing the gun to change its position.

For more than 80 years we have been filling exacting plastics orders for the nation's blue chip companies. Before you discard any design you feel can't be molded in a plastic, call Consolidated.



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in Plastics"
Since 1874

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THE PLASTISCOPE

(From page 181)

0.1 to 0.2% silicone solids based on the phenolic resin solids are suitable for use in insulation. Concentrations of from 0.1 to 0.3 parts per 100 parts resin solids can be added to resin for laminates or it can be used as a finish for the glass cloth by diluting it with water and dipping heat cleaned glass cloth in the solution.

Decorative laminates

Quote from R. T. MacAllister, Manager, Decorative Products, Formica Corp. "I see decorative laminates for every conceivable application . . . to the extent that our material will be accepted as almost as basic to building as steel, or plywood, or paint. I see it not only on counters, vanities, tables and other horizontal surfaces . . . but cutting large chunks of the wall market from the wood, wallpaper and paint people . . . in every room in the house . . . and in commercial and institutional buildings where dirt and maintenance are always a problem.

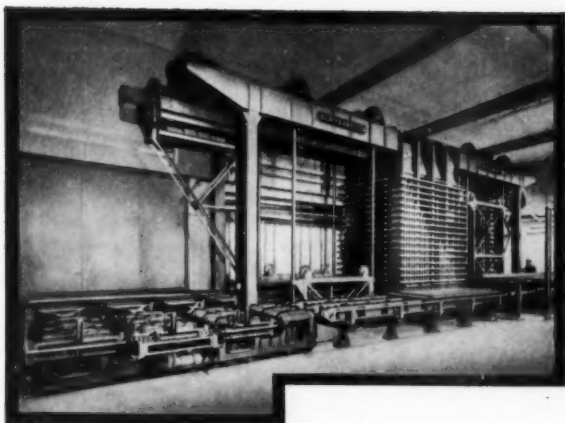
"And we won't stop there . . . some day, perhaps sooner than we think, we can add to our panorama laminated plastic flooring . . . and can cut a chunk out of that profitable market . . . and, of course, laminates for exterior use.

"I'll go so far as to say our industry could expand its market 10 times or more inside a very few years . . . if we sell our ideas for new applications as well as we sell our product for currently accepted applications."

Polybutene

Isotactic polybutene may be the next polyolefin to reach commercial production, according to Dr. Giulio Ballabio, head of the Hydrocarbons and Derivatives Div. of Montecatini. He states that because polybutene's stiffness is lower than that of polypropylene, it is particularly suitable for making sheets for thermoforming. Because of its high tear strength it may find application in wrappings and coatings. Other possible products are cable coverings which would be stiffer (To page 184)

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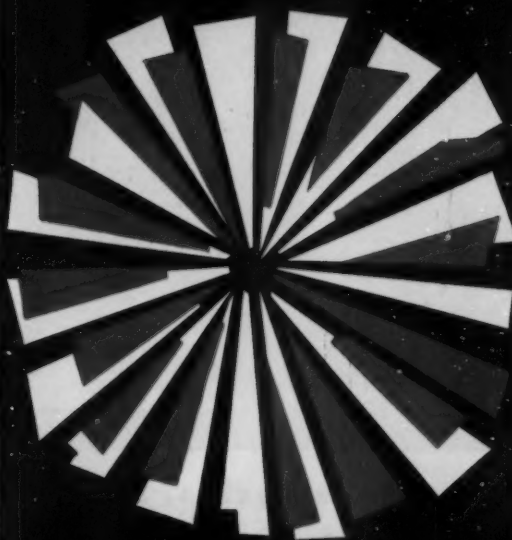
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NEW STOKES 72" VACUUM COATER

Shortens cycles, speeds production and provides more flexible operation

A highly versatile pumping system is the chief reason behind the increased efficiency and flexibility of Stokes new 72" Vacuum Coater. Employing a new "modular" approach to vacuum system design, the new arrangement provides greater pumping capacity and operating versatility . . . at no increase in cost. Pumping down the clean dry chamber can now be accomplished in 4½ minutes or less.

Here's how the modular system works: two separate but identical "teams" of pumps are connected independently to the vacuum chamber. In normal operation both "teams" are used. However, either team may be cut out for periodic maintenance or isolation without shutting down the entire metallizer. It's a real time and cost saver. And to make the equipment even more versatile, a third pump can be easily added.

The new "modular" approach is one more example of progress in vacuum technology at Stokes. Whether it's vacuum metallizing of decorative parts or high-precision components, Stokes experience helps lead the way to greater operating efficiencies. Why not find out how Stokes will help plan your metallizing facilities . . . select the proper equipment . . . train operators. Your nearby Stokes field engineer will be glad to discuss your particular requirements . . . and to make available the facilities of Stokes Laboratory and Advisory Services.

Vacuum Equipment Division
F. J. STOKES CORPORATION
5500 Tabor Road, Philadelphia 20, Pa.

STOKES

THE PLASTISCOPE

(From page 182)

than high pressure PE but less stiff than low pressure or linear PE. The new material is now in the pilot plant stage by Montecatini. Several American firms are also working on butene, particularly as a copolymer with low-pressure polyethylene.

Polypropylene for fabric

Lightweight fabrics made from polypropylene monofilaments are about to be introduced into two new large-volume markets: auto seat covers and outdoor furniture webbing, according to Hercules Powder Co., supplier of the PP resin. Previous commercial use of PP monofilaments was in rope, where their strength-light weight combination is a desirable feature.

The new auto seat-cover fabrics were introduced by several producers at the Auto Seat Cover Manufacturers' Assn. meeting in Chicago, Ill., early in July. The new polypropylene webbing is expected to make its first appearance at the annual Outdoor Furniture Show in October.

Epoxy-paper base laminate

A new, premium grade epoxy paper base cold punch laminate, designated Phenolite Grade EP-491, is announced by National Vulcanized Fibre Co., Wilmington, Del. The new product's electrical properties and dimensional stability are said to be superior to regular XXXP types.

The company developed the new laminate specifically to meet the printed circuit requirements of computer manufacturers. Application in electronic gear for aircraft, missiles, and other military applications is also foreseen.

Porous PVC sheet

A custom perforating service said to impart to supported vinyl film and sheet invisible holes to permit air circulation, etc., is now being offered by Perforated Specialties Co., Inc., New York, N. Y. According to company spokesmen, the backing on the film prevents the perforated holes from flowing shut. Only textured sur- (To page 186)

For your needs in accessories

FOREMOST designs-



A TIGHT OVEN

For really efficient drying, this is the tightest oven constructed. When used in conjunction with a dehumidifier connected to the intake, 99% of the air will come through the dehumidifier. Ovens that have been designed without this factor considered will leak as much

as 30% room air into the system. This is the first plastic drying oven supplied with fiberglass and polyester molded trays which are indestructible, easier to clean, and cooler to the touch.

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So, whether you post-decorate or not, there's a General Mills mold release agent to keep your molds cleaner, smoother—longer—to assure you of perfect, blemish-free plastic molded products!

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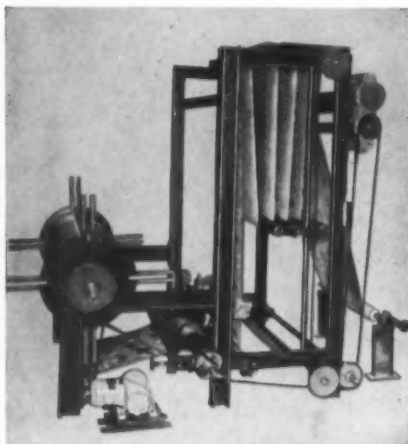
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Turret rewind facilitates rapid roll changes.

70 feet of material with which to work.

Turret can be used on back of any web-processing machine.

Precision guides insure straight rewinds.

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For further details of Liberty's complete range of economical, easy-to-operate processing equipment—including *polishing units, embossers, one and two-color presses and inspection units*—write for Liberty's free catalog!



**LIBERTY
MACHINE CO. INC.**

275 FOURTH AVENUE, PATERSON 4, N. J.

THE PLASTISCOPE

(From page 184)

faces are recommended for this. Plain—and especially light-colored—film will probably show some slight traces of the perforations. According to tests conducted by Better Fabrics Testing Bureau, Inc., New York, highest degree of air-permeability is 4.73 cu. ft./min. Charge for perforating is from 10¢ per running yd., exact price depending on gage, volume, pattern and width.

Bristles in color

A decorative touch has been added to the functional aspects of nylon bristles, with the introduction of Du Pont's Tynex nylon filaments with integral colors. First use is in pastry, clothing, and bath brushes manufactured by Silver-Chamberlin Co., Clay-ton, N. J.

Pastel-colored nylon filaments are also used for paint brushes made by Gerts, Lumbard & Co., Inc., Chicago, Ill. The filaments are tapered and sanded.

Industrial dermatitis control

Workers in the plastics industry and in allied fields that involve the handling of epoxies, curing agents, hardeners, and fibrous glass are frequently susceptible to industrial dermatitis.

Indco Laboratory, Santa Monica, Calif., has developed a program of control, which has been tested extensively by many prime aircraft and plastics manufacturers in Southern California. The program consists of application of a protective creme, #211, before handling of the toxic chemicals, application of a resin remover formula, #214, that is said to eliminate the use of dangerous solvents, and application of a skin re-conditioner, #212, to replace the natural oils removed through working with the chemicals.

Tests by industrial medical staffs and documented studies are said to have shown a spectacular decrease in dermatitis within a very short time after Indco's program was put into effect.

Process and safety engineers at these plants report that the formulae used in the three-step program have non-corrosive

characteristics. The products do not interfere with sealant and adhesive requirements, and they are found to be easy to clean from production parts.

Heat sealable Mylar

Development of a rubber-coated Mylar tape that will heat seal in the 200° F. temperature range, has been announced by Peters Mfg. Co., Wollaston, Mass. This tape is 3 mils thick, using a 1-mil film base, and is rubber coated on one side. It is available in any color. Other gages and constructions can also be supplied.

The tape has UL approval for use over the single conductors in service entrance cable, and is being employed in other wire and cable applications, the company states.

Speeds delivery time on colors

A new electronic system of matching colors for styrene molding compounds has been installed by Monsanto Chemical Co.'s Plastics Division. The sensitivity of this system allows mathematically precise color control during full-scale production operations. Styrene colors can now be selected by specifying the desired chromatic dimensions.

Delivery time on new color selections can be reduced, because a customer's sample can be so accurately matched, that customer verification and approval of trial matches becomes unnecessary.

Wax for PE

A new micro-crystalline wax, designated Multiwax 200, whose high melting point makes it suitable as an additive in extruding polyethylene, and as a lubricant in injection molding of PE, has been developed by L. Sonneborn Sons, Inc.

The wax has a melting point of 200° F. It is manufactured at Sonneborn's Petrolia, Pa., refinery, and will be distributed by Petroleum Specialties, Inc., 205 E. 42nd St., New York 17, N. Y.

Color for epoxies

Paste color concentrates in a complete range of hues for liquid epoxy resins are now available from Ferro Corp. (To page 188)



SEILON ETH

Regular Polyethylene
(Specific Gravity 0.92)

Combines inertness and flexibility over a wide range of temperatures.



SEILON ETH-R

High Density Polyethylene
(Specific Gravity 0.96)

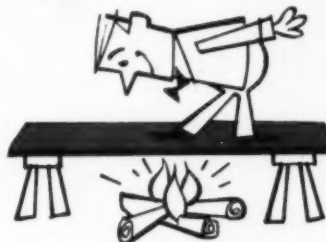
Appreciably stiffer than regular polyethylene. Stiffness and higher heat distortion properties have provided many new production possibilities.



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Polypropylene
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High heat distortion (service temperatures up to 300° F), stiffness and inertness to environmental stress cracking have created new horizons for plastic applications.



The above materials are available in 48" wide rolls from 0.010" to 0.060" in thickness; also available in 48" x 96" sheets from 0.060" to 1.00" in thickness. We will welcome the opportunity to consult with you on your individual specifications. A letter or a phone call will start us working on your problem.



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THE PLASTISCOPE

(From page 187)

The vehicle carrying the color is a 100% liquid epoxy resin that has compatibility and reactivity with other liquid epoxies. The majority of color pigments used are inorganic and give good light fastness and heat stability. The organic colors have superior color brightness and strength but their light stability is inferior to inorganic colors.

PE film on West Coast

Free polyethylene cast film (chilled or quenched) is now being produced on the Pacific Coast at the San Leandro, Calif. plant of Crown Zellerbach's Western-Waxide Division.

In addition to producing free film, a new extruder-coater machine installed by the company may also be used to apply a thin layer of PE to a running web of such materials as film, foil glassine, and paper, and will also coat heavier materials.


The machine is convertible to production of free film in widths up to 60 in. by shifting from laminating rolls to chilled casting rolls. Special controls, designed by Western-Waxide for this unit, regulate film thickness to extremely close tolerances.

The flexibility of the new extruder-coater permits a wide range of laminated combinations. It will also install tear-strings, reinforcing fibers and other materials in polyethylene laminations.

The new machine complements a PE extruder which has been in operation at Western-Waxide's North Portland, Ore. plant since 1955. The North Portland plant concentrates on production of a wide range of PE laminated materials.


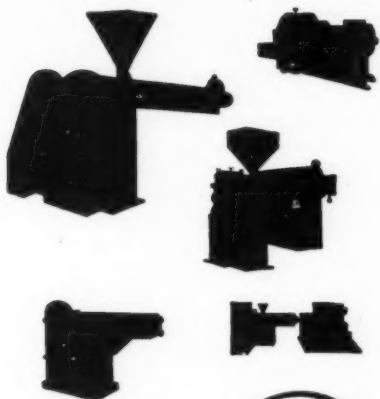
Finances machinery purchases

A plan to enable plastics equipment manufacturers and distributors to set up programs for installment sales of production machinery has been announced by Standard Financial Corp., 530 Fifth Ave., New York 36, N. Y. The financing company will advance to the equipment supplier 90 to 100% of the gross amount of



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the customer's installment note, minus finance charges; collection will be handled by the financing company. Equipment purchasers would be required to make a down payment only of 15% in cash or trade, the balance payable in one to five years.

Insulating tape

A flameproof vinyl tape for insulation and other electrical taping jobs has been introduced by Reeves Soundcraft Corp., Danbury, Conn.

According to the company, the tape offers protection against moisture, surface contamination, corona, and excessive heat. It also prevents corrosion when applied to pipe and other metal surfaces.

A ¾- by 240-in. black roll of Soundcraft vinyl electrical tape costs 55 cents.

Stocks corrugated sheets

Extruded corrugated sheets of polystyrene and Implex A high impact acrylic are now available from stock at all Cadillac Plastic & Chemical Co. warehouses.

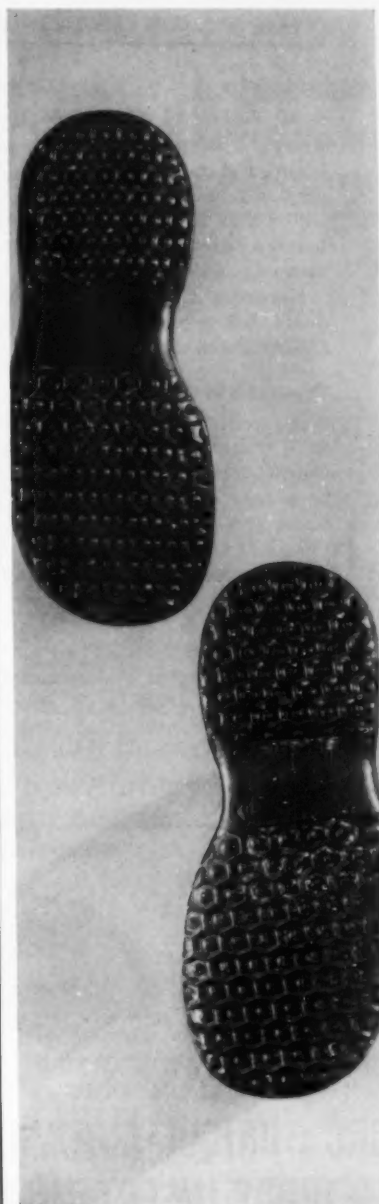
The acrylic sheets are stocked in natural opaque, and the polystyrene in translucent white. Other colors are available on special order.

Standard width is 35½ inches. Standard lengths are 36, 48, 72, and 96 inches. Other lengths up to 25 ft. are available on special order. Sheets are designed with edges that can interlock to produce any desired width without a break in the pattern of corrugations. The corrugated ridges are ⅜ in. wide and flat, providing anchorage for sign letters and elements.

Decorative safety glass

Transparent and translucent decorative panels that combine screen - printed vinyl butyral sandwiched between two layers of glass are produced by Dearborn Glass Co., Bedford Park, Ill. Other patterns involve the use of real fern fronds, leaves, butterflies, random fibers, and fine nets.

Recommended for use wherever safety is paramount, this line of custom designed panels is finding acceptance by architects and builders for entrance doors—door-size panels (To page 190)



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THE PLASTISCOPE

(From page 189)

retail around \$100—shower stall doors and enclosures; foyers; partitions and room dividers. Counters and table tops are other projected uses for the new material that combines delicate art with an integral safety material.

Monsanto Chemical Co. produces Saflex vinyl butyral film for laminated safety glass.

Progress in outdoor signs

Sheet extruded from Tenite butyrate, manufactured by Eastman Chemical Products, Inc. has now been approved as an acceptable material for use in sign construction under the Electrical Code of the City of New York. Lack of such approval had been a severe handicap to use of butyrate for signs in the N. Y. area. This material, when tested in accordance with ASTM D635-44, a sheet 0.060-in. thick burned at a rate of 1.5-in. per minute. (The New York City code specifies that no

plastic which burns faster than 2.5-in. per minute may be used for signs.) Butyrate has been approved for many years under the codes of Los Angeles and San Francisco.

High-luster surface methacrylate sign letters which are said to stay bright indefinitely have been introduced by Plastics Corp., Detroit, Mich. According to the company, the new letters have seven times the impact strength of plate glass, and will not fade, chip, or crack in use. Standard block letters range from 1½ to 35 in. high, and large size script letters are also available.

Changeable letters of formed methacrylate from 4 to 36 in. high in the full color range of Plexiglas are available from Faulkner Laboratories, Tampa, Fla. Methacrylate is also used for mounting tracks, and no metal clips are used.

PE bags for industry

Valve type polyethylene industrial bags, which can be used interchangeably with paper bags

on standard valve bagging equipment, are undergoing extensive field trials. According to E. W. Geigel, supervising engineer of the packaging development group of Monsanto Chemical Co.'s Plastics Div., preliminary tests indicate that the new concept will eliminate the difficulty of satisfactorily heat sealing PE bag closure surfaces which are contaminated during the filling with certain powdery or oily materials.

The new self-closing bag is the result of a series of engineering studies of various closure methods. Pilot quantities of PE industrial bags employing the new concept were made available for testing by Polyethylene Packaging Machinery Co., Unionville, Conn., which also plans to supply equipment to manufacture such bags, Mr. Geigel reports.

Chippewa Plastics, Inc., Chippewa Falls, Wis., has also been testing a newly developed self-closing valve type bag suitable for use with standard spout filling equipment. The company hopes to be in full-scale production on bags of this type in the near future.

Mr. Geigel points out that these latest advances in the development of a heavy gage PE industrial bag show further progress in bringing the all-polyethylene bag to a market conservatively estimated at 75 million bags a year. He reports that a task group to work on bag problems has been appointed by the Manufacturing Chemists' Association.

Polypropylene for France

License agreements to produce Moplen polypropylene in France under the Montecatini-Ziegler patents have been signed between Montecatini of Italy and Pechiney, and La Société Normande de Matières Plastiques—two French producers of chemicals and plastics.

Two plants, each with an annual capacity of 22 million lb., are scheduled to go on stream in 1960.

Polyethylene matting

Ribbed polyethylene sheet, designated Covemat, and suggested as stair covering, bath mat, rug protector, drawer liner, wall pro-

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tector, etc., is marketed by Raritan Plastics Corp., Paterson, N. J. The covering is sold directly to wholesalers and distributors in 50-, 100-, and 500-ft. rolls, 30 in. wide, and is available in clear, grey, green, and beige.

Raritan also markets Shelvomat polyethylene shelf lining in 250-, 500-, and 1000-ft. rolls, 11¼ in. wide. This product is available in clear, red, yellow, turquoise, or pink polyethylene.

Removable coatings

Temporary protection of highly finished surfaces during fabrication, handling, and shipping, is said to be offered by a line of removable modified vinyl coatings manufactured by Guard Coatings Corp., Long Island City, N. Y.

The coatings are furnished in the form of fast-drying solvent solutions or water dispersions and are applied by conventional coating techniques and, when dry, form tough, abrasion-resistant films. The coatings are removed by stripping by hand; by dissolving in a vapor degreaser; by dissolving in mild alkali solution; or by wetting the film with water.

Sponsors plastics research

A basic research project into the behavior of polymeric or plastic materials in the solid state, sponsored by the plastics group of the Manufacturing Chemists' Association, has been undertaken at the Case Institute of Technology, Cleveland, Ohio.

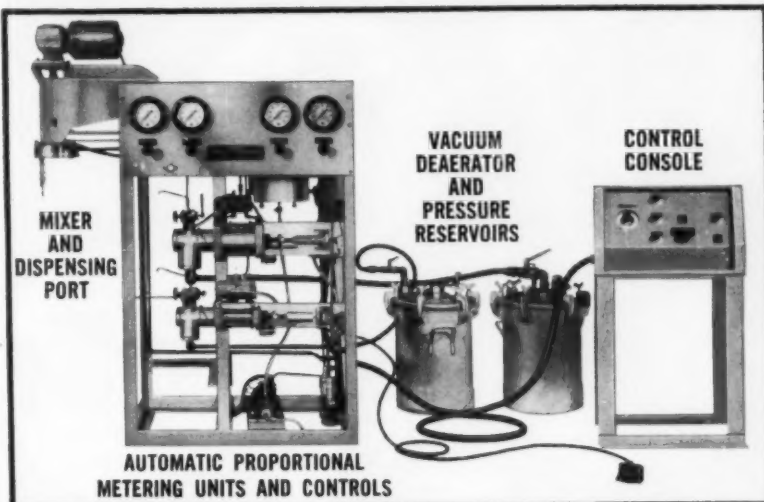
The research under the \$15,000 annual grant will be directed by Selby M. Skinner, associate professor of chemistry at Case. Initial studies will be devoted to precision tensile tests, impact tests, their correlation with measured moduli, and the utilization of results to develop clues as to the mechanisms involved when plastics materials fracture.

Laminated plastics tiles

As a further step in its promotion of Formica for vertical applications, Formica Corp., subsidiary of American Cyanamid Co., has introduced bathroom tiles made of decorative laminates. The tiles measure 10 by 10 in., are available in eight colors, and can be installed with the (To page 192)

For the first time . . .

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- proved reliability
- high accuracy of proportioning
- uniform, homogenous mix
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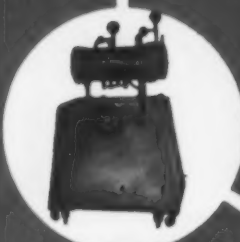
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Plant for
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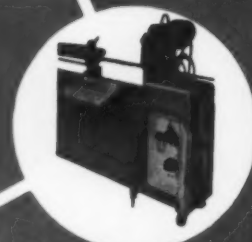
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THE PLASTISCOPE

(From page 191)

company's dry adhesive. Test marketing is said to have shown an installed cost, including tile, adhesive, and contractor profit, of \$1.19 per square foot.

Flexographic printing courses

Six-week courses to train unskilled help as pressmen are being given by Lee Machinery Corp., School & Parts Dept., 416 West 33rd St., New York 10, N. Y. The course is given three days a week, and includes training in operating a flexographic press, information about ingredients, diameters of cylinders, color matching of inks, etc. According to Lee, this is a non-profit service, and employers are required to pay only \$25 for supplies used by trainees. The next course begins Sept. 21.

More uses for Mylar

Widespread acceptance of Du Pont's Mylar polyester film in the stationery field has been evident in recent trade shows.

Most common items using the film are sheet protectors and punched sheet reinforcement. In the former, Mylar replaces materials more than twice as thick as the 2-mil polyester film; in the latter it takes the place of heavy paper reinforcements that protect against page pull-out. Book jackets offered in roll form, ready to be cut to fit standard book sizes, are a new development.

Sheets and rolls in sizes up to 23 in. wide and 50 ft. long for protective laminations for large maps and charts, documents, cards, and similar items, are also said to be a good market for this material.

Typewriter ribbons of Mylar have been adopted by at least one major typewriter producer as standard equipment on new machines.

Other stationery items using the film include tabs, index card protectors, job-ticket holders, and a variety of similar products.

Technical information on vacuum coating

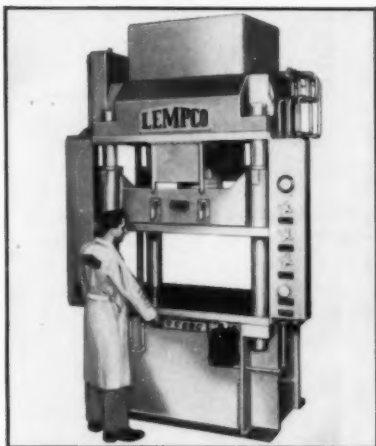
A booklet containing the technical papers presented at the 1958 fall meeting and technical conference of the Society of Vacuum

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Coaters is now available for \$10 per copy from Robert Lux, Society of Vacuum Coaters, P. O. Box 3095, Cleveland 17, Ohio.

Papers on the technical and practical applications and techniques involved in functional and decorative vapor deposition are requested for the next annual technical conference which is scheduled for January 1960, in New York, N.Y. Those interested are asked to send a 100-word abstract as soon as possible to J. Scharnburg, program chairman, Bee Chemical Co., 12933 South Stony Island Ave., Chicago 33, Ill.

At the 1958 fall meeting, Robert A. Feid, B & T Plastic Finishing Co.; Robert A. Gray, The New York Air Brake Co.; and William Pahl, Ford Motor Co.; were elected to the Executive Committee.

Waterproof strapping tape

A pressure-sensitive strapping tape for heavy duty packaging and bottling has been developed by Permcel, New Brunswick, N. J.

Designated Permcel 163, it uses a Mylar backing, rayon strand reinforcement, and a formulation of a waterproof, transparent adhesive. The thin polyester film backing is said to give the tape an extremely high degree of abrasion resistance.

Bright red pigment

An opaque, bright yellowish-red pigment, designated Orion Red CP-1300, is available from the Pigment, Color & Chemical Div., The Sherwin-Williams Co., 260 Madison Ave., New York 16, N. Y.

The new colorant is said to have excellent heat resistance in plastics, very good bleed resistance, and fair resistance to light. It is reportedly an easy grinding pigment.

According to the company, Orion Red is particularly suitable for polystyrene (regular and high-impact types).

New companies

Pecorp, Inc., Basin Rd., Newport, Del., has been formed to manufacture and sell cooling units for all molding operations. The units, which will either (To page 194)



POLY-KLEEN
for cleaning polystyrene



REZ-N-KLEEN
for cleaning acrylics



REZ-N-POLISH
for polishing acrylics

Cleaners & polishers

For polystyrene or acrylics, manufacturers the world over have found Schwartz Cleaners the most dependable in the field.

REZ-N-KLEEN: A liquid cleaner for removing masking tape and other foreign matter from lucite or plexiglass.

POLY-KLEEN: A liquid cleaner for removing lacquer over-spray, grease, adhesives, etc. from polystyrene. Will not craze or mar even the thinnest sheet.

REZ-N-POLISH: A cleaner, polisher, and anti-static agent for removing haze and cloudiness on acrylics.

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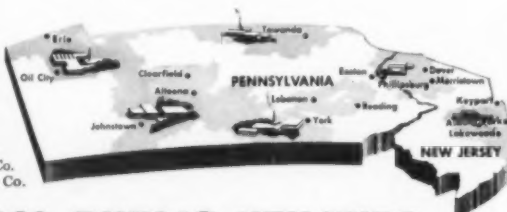
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Metropolitan Edison Co.
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New Jersey Power & Light Co.
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GENERAL PUBLIC UTILITIES CORPORATION

Att: Wm. J. Jamieson, Area Development Director, Dept. MP-2
67 Broad St., New York 4, N. Y. Whitehall 3-5600

THE PLASTISCOPE

(From page 193)

air- or water-cool molds, are designed for the plastics industry. W. S. Peuchen is president.

Foam-Flex Corp., 550 Fifth Ave., New York, N. Y., was formed to develop a new urethane foam sandwich material. The company will sub-license other firms.

Joseph M. Gordon, now active in the new company, was previously sole licensee of the process and apparatus to sandwich urethane foam between kraft paper or combinations of plastic films and foils.

Expansion

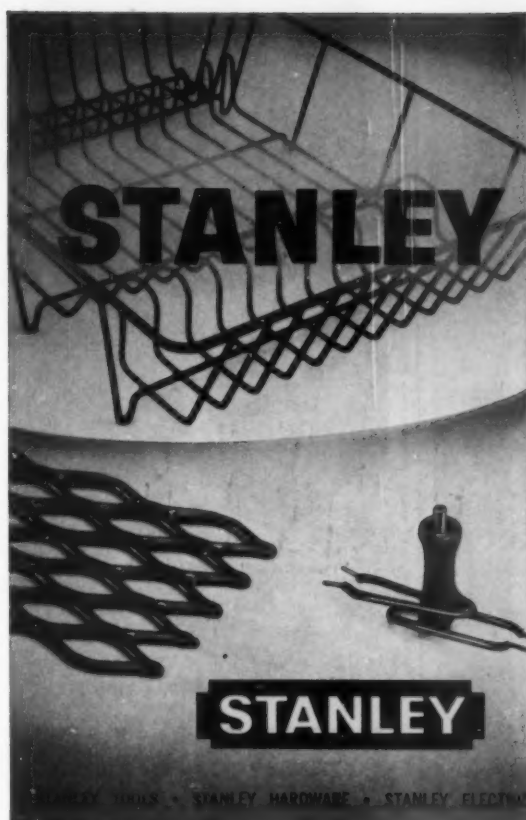
Commercial Plastics & Supply Corp. has acquired a new one-story warehouse at 410 Morgan Ave., Brooklyn, N. Y. The building adds 25,000 sq. ft. to the company's present facilities, giving the firm a total of 75,000 sq. ft. of warehouse space in the N. Y. metropolitan area.

Commercial is a distributor of Plexiglas, vinyls, acetates, phenolic laminates, nylon, Teflon, Kel-F, polyethylene, polystyrene, Rexolite, Fiberglas, and other plastics materials.

Filon Plastics Corp. broke ground in Hawthorne, Calif., for a new \$1 million facility devoted to the production of fibrous glass-reinforced building panels. The new 72,000-sq. ft. factory, on a 9-acre site, will be ready for occupancy before the end of this year.

Union Carbide Plastics Co. announced that its new liquid epoxy resins plant at Marietta, Ohio, has gone on stream. The plant has a rated capacity of 15 million lb. annually.

Appleton Machine Co., Appleton, Wis., has established a new research laboratory, designed to solve other companies' slitting and winding problems. The new facility will be used to test plastics, paper, textiles, and other materials and to develop improved methods of slitting and winding. It will be operated by the **Doven Div.** The service is offered without (To page 196)



Wire Goods LOOK BETTER, LAST LONGER, SELL EASIER when coated with **PLASTISOLS**

Whether you manufacture industrial equipment, where high resistance to abrasion, chemicals, oils or fumes is needed . . . or articles for the home, where attractive appearance is important . . . Stanley Plastisol Coatings will add value and sales appeal to your wire goods.

Custom formulated, and available in a wide range of colors, Stanley Plastisol Coatings are supplied for cold dip, and gasket coating applications. For complete information, write for Idea File Folder and data sheets.

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Subsidiary of The Stanley Works

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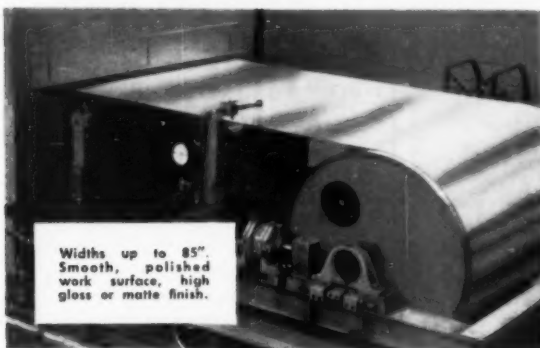
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Heating—hot fusing—
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in one continuous operation



Widths up to 85"
Smooth, polished
work surface, high
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If you produce sheets, film, coated products, laminates, flooring, foam rubber or other flat work of plastic or rubber—investigate the cost-cutting, improved results being obtained with "Metalsmiths" Endless Stainless Steel Belts. "Metalsmiths" are specialists in stainless steel belt fabrication and application. Send details of your production requirements for engineering advice, without obligation. Metalsmiths, 558 White St., Orange, N. J.

**METALSMITHS STAINLESS STEEL
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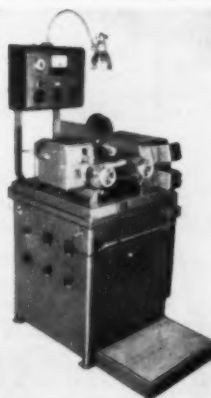
SPECIALIZED MANUFACTURERS

DEVELOPMENT AND CONSTRUCTION OF PROTOTYPES

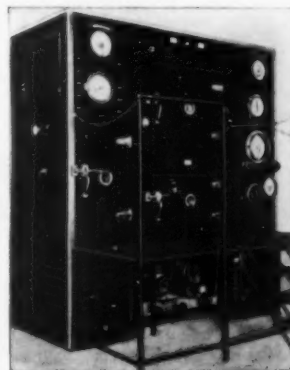
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- Specialized commercial laboratory apparatus, singly and in moderate quantities.
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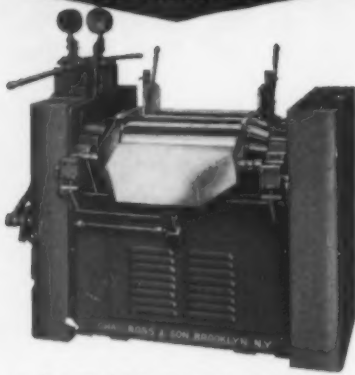
- 1 MIXING-CALENDERING, PLASTICS AND RUBBER LAMINATING
- 2 APPARATUS FOR CYCLED AGEING
- 3 COMPOSITE EQUIPMENT: MIXING-CALENDERING, AGEING AND PRE-HEATING EQUIPMENT, COMPRESSION MOULDING AND INJECTION MOULDING/EXTRUSION



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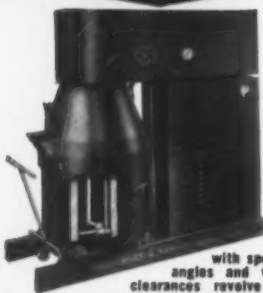
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NEW **Koss** HIGH SPEED THREE ROLL MILLS WITH— ONE POINT HYDRAULIC ROLL ADJUSTMENT



- Pressure indicating gauges provide greater ease in properly setting rolls, and less skill or experience is required by operator.
- Roll pressure settings can be recorded for exact reproduction of material assuring standardization of product.
- Special equalizers assure positive parallelism of roll faces at all times for uniform dispersions and minimum maintenance costs.
- Mills have quick roll release with safety overload feature, and are convertible for either fixed or floating center roll operation. 2½x5, 4½x10, 6x14, 9x24, 12x30, 14x32, and 16x40" sizes.

Production size dispersion type
Change Can Mixers with—
DOUBLE PLANETARY
stirrer action.



- Stirrers with special blade angles and very close clearances revolve on their own axis and also around can, developing 12 intense compressive and shearing actions with each revolution to break down and disperse lumps.
- Variable speed for infinite range of stirrer speed control.
- Simplified vertical hydraulic lift for greatest ease in cleaning down stirrers.
- Non-revolving can is completely enclosed during mixing for safety and to reduce solvent loss. Cans can be jacketed or fitted with slide gate when required. Cans are easily positioned or removed from Mixer.
- Extra heavy construction and standard type motor eliminate costly downtime. Oversized motor drives can be provided for kneading and mixing extremely heavy materials. 1, 2, 3, 4, 8, 12, 25, 50, 65, 85, 125 and 150 gallon sizes.

Area of can contacted by stirrers during only one revolution of stirrers around can (2 seconds). Position of stirrers advances 4½" with each successive revolution to sweep entire area and all points on sides of can. Stirrers overlap each other as well as center of can.

Write for further information!
CHARLES ROSS & SON COMPANY, INC.
150-152 Classon Avenue
Brooklyn 5, N. Y., U. S. A.

THE PLASTISCOPE

(From page 194)

charge to any firm sending in a sample of its material and specifications for slitting and winding.

One recent problem successfully solved by the company's technicians was to slit ¼-in. thick Teflon into ¼-in. cubes. Previously, the material was converted to these shapes by a slower method using band saws.

Reichhold Chemicals, Inc. has put on stream the first phase of its new synthetic resin plant at Houston, Texas. Initial production is of polyester resins, principally for the reinforced plastics industry, and alkyd resins, used in the manufacture of surface coatings.

Donald E. Leever is manager of the plant.

Tube-Kote, Inc. has begun production in its pipe-coating plant near Midland, Texas. Built on a 17-acre plot, the \$250,000 facility has a capacity of coating 8000 ft. of pipe a day, and will employ between 30 and 35 men.

The Textileather Div. of The General Tire & Rubber Co., Toledo, Ohio, has launched a \$1 million expansion program, which includes the installation of a giant, high-speed calender.

The new calender will enable Textileather to produce vinyl materials in widths up to 84 in., including unsupported sheetings, laminated vinyl materials, semi-rigid and rigid plastics.

The building now being constructed will have 10,000 sq. ft. of working space and house the 20-ft. calender, plus necessary mills, Banburys, and blenders.

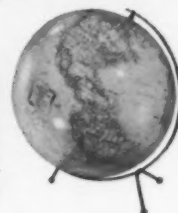
The calender is slated to be installed about mid-August, and work is expected to be completed late this fall.

American Industrial Chemical Co., Div. of Amerace Corp., has opened a new plant at Butler, N. J., to produce several grades of adsorptive magnesium silicate. Designated Aicco-Sol, these products are used for preventing blisters by adsorbing vapor and gases released during molding;

"IF IT CAN BE MADE OF VINYL



HEAT-SEALED
"THERMO BAG"



HAMMOND
WORLD GLOBE
(Inflatable)



CRASH-PROOF AUTOMOBILE SUN VISOR

PETERSON DIES

CAN MAKE IT BETTER...

ELECTRONIC SEALING DIES

• That's what the leaders in plastic fabricating say about Peterson Electronic Sealing Dies . . . Automatic Devices . . . Automatic Indexing and Feeding Equipment.

• Merely give Peterson the problem. We work from your blueprints . . . or your ideas . . . to create the equipment to do the job you want done . . . better, cheaper, faster.

Second generation of die makers:
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A. W. PETERSON & SON DIE COMPANY, INC.

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preventing caking in plastics molding compounds; and controlling thixotropy of plastics coatings.

The Dayton Rubber Co. has formed **The Dayton Industrial Products Co.** as a new division with headquarters in Chicago, Ill. The new company will be responsible for sales, advertising, product engineering and application for Dayton Rubber automotive and industrial parts, including urethane products and plastics electrical tapes, and other products of the former mechanical goods sales division.

Robert G. Burson, a VP of Dayton Rubber, will head the new company.

Modern Plastic Machinery Corp. is tripling the size of its facilities and acquired the 80,000-sq. ft. plant formerly occupied by the **Curtiss-Wright Corp.** in Clifton, N. J.

Claremont Pigment Dispersion Corp. has broken ground for construction of a 10,000-sq. ft. addition to its plant at Roslyn Heights, N. Y.

Kordite Corp.'s plant in Jacksonville, Ill. is now in full operation producing polyethylene film up to 40 ft. wide.

Purchased by the company in 1957, the 200,000-sq. ft. plant employs 300 people to produce PE sheeting and other PE products. The plant will also serve as a central warehouse.

Rex Fiberglass Distributors, Inc. has taken over the assets and control of **Plas-Tex Industrial Distributors, Inc.**, Houston, Texas. Rex will expand its facilities and sales force for polyester resins, fibrous glass cloths and mat, catalysts, etc.

Louis Kovreg is pres. of Rex. The company's warehouse will be located at 1809 Luzon, Houston, until the new facilities are completed.

Ferro Chemical, a division of **Ferro Corp.**, Bedford, Ohio, has completed a \$150,000 expansion for the production of stabilizers for
(To page 198)



AN EXCELLENT CATALYST
FOR USE IN POLYESTER
RESINS AT
INTERMEDIATE AND LOW
TEMPERATURES

SPECIFICATIONS

Benzoyl Peroxide	50.0% (Min.)
Active Oxygen	3.3% (Min.)

LUPERCO ATC is a thick, white, peroxide paste containing benzoyl peroxide compounded with tricresyl phosphate. Readily soluble in most monomers due to the fine dispersion of the benzoyl peroxide, **LUPERCO ATC** is convenient to handle and features a marked reduction in flammability.

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WALLACE & TIERNAN INCORPORATED
1740 MILITARY ROAD
BUFFALO 5, NEW YORK



YOU'VE ENOUGH WITH A KANE VERTICAL BOILER

Searching for more floor space in your shop or plant can be very perplexing and expensive... especially when some of the vital space is being occupied by an old fashioned, cumbersome, horizontal type boiler. More and more shop and plant supervisors are now finding out how a KANE VERTICAL BOILER PACKAGE produces even better results within a much smaller space.



The KANE Boiler, built to A.S.M.E. specifications, in sizes to 30 H.P.

The KANE VERTICAL BOILER PACKAGE includes: the correctly sized Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

Send now for full details in our new Bulletins No. 2L and No. 4H.

(Similar boilers are available for use with combination gas-oil... For pressures up to 350 lbs... Write for Bulletin No. 7D.)



"Engineered Steam at its best, with over 50 years of experience at your disposal!"

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THE PLASTISCOPE

(From page 197)

vinyl plastics and other organic chemicals. The new unit includes 3100 sq. ft. of additional space, a 50,000-gal. capacity tank farm, and a Dowtherm system.

National Starch & Chemical Corp. has installed an experimental paper coater at Plainfield, N. J., which is 45 ft. long, and capable of coating, drying, and calendering paper stock at speeds up to 2000 ft./min. The new equipment enables the company to run tests of new materials under realistic mill-operating conditions.

Alkali & Chemical Corp. of India, a subsidiary of I.C.I. (India) Private Ltd., has opened India's first full-scale polyethylene plant at Rishra, near Calcutta. The new plant, which cost approximately \$9 million, has a capacity of 3500 tons of PE, which will be produced by the I.C.I. high-pressure process. The plant is expected to save India over \$3 million a year in foreign exchange.

Demand for PE is increasing rapidly in India. In 1952 when I.C.I. (India) began making film from imported raw material, total Indian consumption was 100 tons. In 1958 it had reached 2100 tons. Altogether, more than 200 Indian concerns are now manufacturing polyethylene products.

Durable Formed Products, Inc. has set up its own epoxy tool making department. The department will be able to fill tooling requirements for Durable and for its associated organization, Techni-Plastics, Inc., Port Washington, N. Y.

Deceased

James H. Hibben, Chief of the Chemical Division of the Tariff Commission, died suddenly at George Washington University Hospital, after a fall at his home, near Washington, D. C.

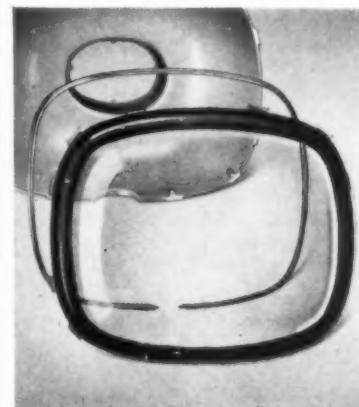
He was responsible for the organization and publication of the Tariff Commission's annual report on "Synthetic Organic Chemicals, U. S. Production and Sales."



1 PROTECTIVE FACE for picture tube housing is a one-piece injection molding of Tenite Butyrate plastic. Dark strip around edge is a "frame effect" created by painting the inside border. Molded for Philco by Buffalo Molded Plastics, Inc., Erie, Pa.

Tenite Butyrate has two jobs in new Philco TV sets

2 DECORATIVE TRIM STRIP that conceals the joint between Butyrate face plate and rear shell of tube housing is an extrusion of Tenite Butyrate. Strip is extruded with an aluminum foil insert to simulate a metal molding. Trim strip, post-formed to conform to shape of housing, is supplied by Anchor Plastics Co., Inc., Long Island City, N. Y.





A new tough face comes to TV

**Philco takes the picture tube out of the chassis
...protects it with a face of tough Butyrate plastic**

The new line of Philco Predicta TV sets is another example of how Tenite Butyrate plastic can be used to improve the design and sales appeal of products.

Thanks to the toughest "face" on TV—a one-piece molding of clear Tenite Butyrate, tinted to minimize glare—Philco now features a picture tube that is dramatically set apart from the chassis.

Although many factors contributed to the choice of Butyrate here, the basic consideration was its inherent toughness, since a separated picture tube would be exposed to extra hazards.

In Butyrate, Philco engineers found a material with all the toughness and impact resistance they needed. Moreover, this Eastman plastic also satisfied the other requirements involved...light weight...optical clarity...resilience...easy moldability...high dielectric strength.

Incidentally, the color that imparts an eye-easing tint to the face is part of the plastic itself. Philco designers were able to specify the color desired, and Tenite molding com-

pound was supplied to the molder in an exact match. Result: the tinting color is an integral part of the face, not merely a coating that might wear, chip or flake off.

If you are designing or redesigning a product, consider Tenite Butyrate whenever you need a truly tough plastic. Easy to mold, extrude or vacuum-form, Tenite Butyrate is available in clear and colored transparents, translucents, opaques, metallics, and variegations to match your specifications. For more information, write EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

TENITE
BUTYRATE
an Eastman plastic

COMPANIES...PEOPLE

Appointments, promotions, and relocations in the plastics industry.

Borden Chemical Co.: Robert J. Dunn named mgr. of the resin and formaldehyde plant, and Robert P. Craver appointed mgr. of the casein plant. Both plants are operated by the resins and chemicals dept. at Bainbridge, N. Y.

Richard Macomes Lee named product mgr. for phonographic record materials of the PVC dept.

Resinite Dept.: Herbert R. Erickson, development mgr. at the North Andover, Mass. plant, assumed the additional responsibilities of operations mgr. He succeeds H. L. Bartlett, plant mgr., who will enter his own business.

Allied Chemical Corp.—Plastics & Coal Chemicals Div.: Adrian H. Cubberley named coordinator of chemicals, R & D dept.

National Aniline Div.: Bertram M. Helfaer is in charge of Harmon Colors, but continues also as asst. dir.—R & D. Charles B. Cole named mgr. at Harmon's office and operations in Haledon, N. J.

Union Carbide Corp.—Union Carbide Plastics Co.: R. W. Mathews appointed marketing mgr., Vinyl Foam Div.

Union Carbide Chemicals Co.: Dr. Arthur B. Steele named dir.—tech. service lab., in addition to his present activities as mgr.—tech. service. He will function as resident dir. of the new tech. service lab. in Westchester county, N. Y., which is scheduled for completion this fall.

Walter J. Fitzpatrick, Jr. named asst. to product sales mgr.

Frank W. Bennett joined the development dept. in S. Charleston, W. Va.

William J. Reid named asst. mgr.—market research.

Crown Zellerbach Corp.: A. B. Layton relinquished his posts as pres. and admin. officer to become chrmn. of the newly established Finance Committee, and to preside at meetings of the board and of the exec. committee in the absence of J. D. and H. L. Zellerbach. Reed O. Hunt, formerly exec. VP, is now pres. and chief exec. officer. He is succeeded by P. T. Sinclair, previously pres. of Crown Zellerbach Canada Ltd. G. H. Gallaway now heads the Canadian operation.

D. J. Benjamin named to new post of VP-Packaging operations.

Monsanto Chemical Co., Plastics Div.: Dr. Edgar E. Hardy, previously dir. of research for Mobay Chemical Co., appointed an associate in the development dept. Robert L. Berra, formerly dir.—sales admin., named

dir.—personnel. J. N. Flanagan appointed admin. asst. to the dir.—marketing. All these appointments are at Springfield, Mass.

Owens-Corning Fiberglas Corp. appointed the following VPs in a realignment of the company's marketing organization: John W. Trimble—sales branch operation with offices in Toledo, Ohio; D. W. Ladd, Jr.—Eastern region in New York, N. Y.; W. W. Boeschstein—Central region in Detroit, Mich.; R. E. Brown—mid-continent region in Kansas City, Kan.

The following were appointed to new management posts as marketing VPs: W. M. Keller—reinforced plastics; E. J. Detgen—home building products; T. V. Fowler—sales to mfrs.; J. A. McKay—industrial and commercial construction materials; S. J. Weinberg, Jr.—textile fabrics.

Diamond Alkali Co.: J. W. L. Fordham named mgr.—R & D dept., Plastics Div., Cleveland, Ohio.

Peter S. Weill appointed group leader—applications development, plastics research dept., Painesville, Ohio.

Dr. Frank Slezak named group leader—polymer section, research dept. Dr. John A. Bungs and Dr. G. H. McCain appointed research associates.

Du Pont, Polychemicals Dept.: Dr. Robert C. Doban, supv. in the R & D laboratory, transferred from the Experimental Station to the corresponding laboratory at the Washington Works, Parkersburg, W. Va. He will continue to direct research on the development and application of Teflon and Teflon 100X perfluorocarbon resins.

Joseph Fred Anderson, supv. in the Laboratory Services Section of the R & D Div. at the Experimental Station, Wilmington, Del., is retiring after more than 42 years service with Du Pont.

B. F. Goodrich Co.: Dr. Marvin Lehr joined the chemical research dept. at its research center, Brecksville, Ohio, to work on polymers.

B. F. Goodrich Chemical Co.: J. Kenneth Koster named mgr. of production and engineering at the Calvert City, Ky., general chemical plant.

W. R. Grace & Co., Polymer Chemicals Div., realigned the sales dept. into four districts.

Ralph Biondi named mgr., Northeastern sales dist., comprising N. Y., and all of New England. He is based in Clifton, N. J. Warren Peterson becomes mgr., Middle Atlantic and

Southern sales dist. His home office is also in Clifton, and the dist. includes the area south of New England to Fla., and to the west as far as Miss., Tenn., Ky., and Ohio. W. D. Singleton, headquartered in Chicago, Ill., is mgr. Midwestern sales dist. DeWitt Cheney, based in Los Angeles, Calif., has been appointed mgr., Western sales dist.

Hooker Chemical Corp. established an office at 16 Stratton St., London, England, as a base for liaison between the American firm and European companies with respect to both chemicals and plastics. Dr. Basil V. de G. Walden is Hooker's chief European rep. He is assisted by Alexander A. Ostrowski.

Export sales continue as the responsibility of Walter E. Buchenhorner, mgr.—export sales, at Hooker's New York, N. Y. offices.

Chemical Market Research Assn.: James E. Sayre, mgr.—market research, Plastics & Coal Chemicals Div., Allied Chemical Corp., elected pres. He succeeds Kenneth R. Parker, mgr. of market research. B. F. Goodrich Chemical Co. J. William Everson, Dow Chemical Co., is pres.-elect.

Chippewa Plastics Co., Chippewa Falls, Wis.: James E. McDonell, formerly a production mgr., appointed plants mgr. Norman Boos succeeds Mr. McDonell as a production mgr. at the First Ave. plant and Jack Nelson named plant sup't of the company's Howard St. plant.

Shell Development Co.: Carl G. Schwarzer assigned to the plastics and resins div. of Shell Chemical Corp.'s plant, Pittsburg, Calif. Robert W. Martin appointed head of the thermoplastics dept. at the Emeryville, Calif., Research Center.

The General Tire & Rubber Co.: Charles L. Becker named to direct centralized sales to jobbers and distributors of the company's vinyl upholstery fabrics, and also the sale of vinyl fabrics produced by General's three plastic plants for the office furniture and institutional fields.

John M. O'Grady appointed purchasing agent of the Textile Leather Div.

Western Canadian Plastics Assn.: W. J. (Bill) McGeachie elected pres., J. A. (John) Kriss, 1st VP, and W. (Wilf) Sinitin, 2nd VP.

H. K. Porter Co., Inc.: Paul A. Benke, formerly VP in charge of the Detroit, Mich. area, assumed the additional responsibility of (To page 202)

The toughest films start with **"TOUGH 706"**



The drop-dart test demonstrates the toughness of industrial films. The film that survives the highest drop of a weighted dart without tearing is, naturally, the one with the greatest impact strength. None "can take it" better than film extruded from Monsanto Polyethylene 706.

That's not surprising. 706 was specifically developed to produce the high grade of toughness called for in industrial packaging and barrier requirements. In addition, this resin is extremely uniform, blend to blend and bag to bag, to assure great consistency in extrusion and converting. Ease of opening and dependable heat sealing are other reasons why 706 today is already performing successfully in hundreds of industrial film applications.

For complete resin and processing data and a report on the drop-dart test write to Monsanto Chemical Company, Plastics Division, Room 959, Springfield 2, Mass.



POLYETHYLENE 706

COMPANIES...PEOPLE

(From page 200)

gen. mgr. of the Mouldings Div., with plants at Detroit, Mich., and Frankfort, Ky. **O. D. Herron**, former gen. mgr., will continue to serve the div. in a consulting capacity.

Metal & Thermit Corp.: **Gerry P. Mack**, formerly product mgr. for stabilizers, appointed product mgr. for the company's entire line of organic chemicals.

Dr. R. M. Kary joined the research staff.

Farrel-Birmingham Co., Inc.: **Elmer F. Myers** named mgr. of the Akron, Ohio, territory. He succeeds **William B. Bowen**, who will transfer to company headquarters at Ansonia, Conn. to become R & D engineer.

Austin Kuhns, sr. VP, retired.

Olin Mathieson Chemical Corp.: **Sydney C. Freeman** appointed film engineer for the film operation of the Packaging Div., N. Y., N. Y. **Rennold L. Klawson** named sales service rep. for the film operation in the Atlanta, Ga., office of the same div.

The Ceilcote Co.: **John G. Galloway** named Eastern sales mgr. He will head the company's Eastern office in Princeton, N. J., and assume responsibility for the operation of Ceilcote's warehouses in that territory.

T. D. Skaggs appointed Southeastern sales mgr. with headquarters in Birmingham, Ala.

Resin Formulators, Inc., Los Angeles, Calif.: **George Whitbread** appointed tech. dir. **Bernard Grossman** joined firm as chemical sales engineer for the San Fernando Valley area.

Ciba Co., Inc. moved from New York, N. Y. to Fair Lawn, N. J. Included in the move will be all elements of the central staff, customer service laboratories, central warehouse facilities, and the Metropolitan Dist. sales office and laboratories.

ESB-Reeves Corp., Philadelphia, Pa.: **C. F. Norberg**, pres. of **The Electric Storage Battery Co.**, becomes chrmn. **J. E. Reeves** is pres., **Dr. V. L. Erlich**, **J. D. Moore**, **D. N. Smith**, **Dr. H. J. Strauss**, and **J. H. Wyatt** are VPs, and **E. J. Dwyer** is secy.-treas.

Nosco Plastics, Inc.: **Fred D. Oberkircher, Jr.** promoted from sales engineer to sales supv. in charge of the home office, upper N. Y. state, and Midwest territories. **J. D. Sticker**, former Eastern sales rep., transferred to the home office.

Modiglass Fibers, Inc.: **Gene Carney** transferred from the East to be Western sales rep. in the Los Angeles, Calif. area. **Frank Warren**,

formerly with Union Carbide Plastics Co., will work out of the Flornham Park, N. J., office as Eastern rep.

Point-of-Purchase Advertising Institute, Inc.: **Stanley L. Wessel**, pres., **Stanley Wessel & Co.**, Chicago, Ill., elected chrmn.; **O. H. (Bob) Stark**, VP & sales mgr., **Snyder & Black & Schlegel, Inc.**, White Plains, N. Y., is pres.

The Vlcek Tool Co., Plastics Div.: **Donald T. Wynne, Jr.**, named div. mgr., in charge of all plastics operations. **Granville H. Shirley** is the new div. sales mgr. **Forest E. Wall** is dist. mgr. for the Ohio sales area.

Admiral Coated Products, Inc. moved its plant from Tiffany Pl., Brooklyn, N. Y., to 20 Railroad Ave., Hackensack, N. J.

Paul E. Cornyn appointed mgr.—advertising and sales promotion, **Plastics Div., Koppers Co., Inc.** He joined the company in 1952.



P. E. Cornyn

Fabricon Products, div. of Eagle-Picher Co.: **David A. Yeomans** returned to the company as prod. mgr. of the Impregnating Div. During the past two and one-half years, he had been associated with two other firms. **John T. Watkins, Jr.** named asst. to the VP.

Harry Stephenson appointed sales rep. for the company's Phenopreg line of glass preregs.

John C. Marshall, VP and gen. mgr. of the Consumer Products div., **Arvin Industries, Inc.**, retired. He will be succeeded by **Orphie R. Bridges**, who for the past year has been VP in charge of new product development.

George N. Wilcox promoted from asst. to the sales mgr. to the newly-created post of dir. of marketing at the **Watertown Mfg. Co.**, Watertown, Conn. He will direct all sales activities of the company's Lifetime Melmac dinnerware lines and of the Custom Molding Div.

Robert G. Luskin appointed sales mgr., **American Chemical Corp.**, Watson, Calif.

Al Dames appointed sales mgr. of **Hastings Plastics, Inc.**, Santa Monica, Calif.

W. C. Curtis appointed mgr., sales for the Central Div., **Continental Can Co.—Flexible Packaging Div.** He will continue in his present capacity as product sales mgr. for transparent

films, and is also slated to spearhead the Flexible Packaging Div.'s sales program for polyethylene film and flexographic roll stock. His headquarters will be at Mt. Vernon, Ohio.

Robert R. Schneider appointed Central Region mgr. of **Flexonics Corp.** He replaces **Robert G. Arnold**, who was appointed Western Region mgr.

Alan G. Richards elected VP of **Bjorksten Research Laboratories**, Madison, Wis.

Robert S. Brown joined **M. C. Gill Corp.**, South El Monte, Calif., plastics mfr., as production supt.

Frederick S. Leinbach elected pres. **Riegel Paper Corp.** **John L. Riegel**, who has been chrmn. of the board and pres., will continue as chrmn. of the company.

Morris Barchard, mgr. of the Plastics Div., promoted to VP of **General Industries Co.**, Elyria, Ohio.

Jeffrey W. Meyer named pres. of **Wilson & Geo. Meyer & Co.** He succeeds **Wilson Meyer**, who is now chrmn. of the board.

Leonard J. Rawson appointed VP in charge of Engineering, **Kurz-Kasch, Inc.**, Dayton, Ohio.

Willard W. White, Jr., appointed dir. of R & D, **Synvar Corp.**, Wilmington, Del.

George Konkol appointed to newly created post of gen. mfg. mgr. for the Parts Div., **Sylvania Electric Products, Inc.**, Warren, Pa.

Floyd F. Miller joined **Goodrich-Gulf Chemicals, Inc.**, Cleveland, Ohio, as a sr. engineer.

Howard F. Modjeski joined the staff of **Midwest Technical Service**, Downers Grove, Ill., engineers and consultants to the plastics industry.

James E. McCauley appointed VP of the **Orangeburg Mfg. Co.**, a div. of **The Flintkote Co.**

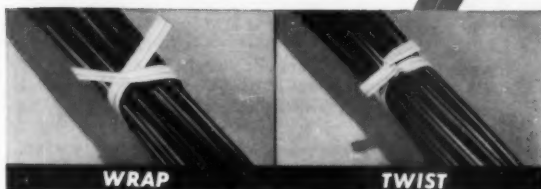
Dr. Frank K. Schoenfeld, VP-R & D, **The B. F. Goodrich Co.**, received the **Industrial Research Institute, Inc.** 1959 medal.

Walter Cowan named gen. mgr. for **Barclay Mfg. Co., Inc.**, N. Y., N. Y.

Roy C. Matzen appointed div. mgr. of the new Chicago, Ill., area industrial cutting tool center of **Super Tool Co.**, div. of **Van Norman Industries**, Detroit, Mich.

Ronald A. Shelden, an M.S.E. candidate of Princeton University, was awarded the newly established **American-Italy Society "Montecatini"** Fellowship, granted to an American student for (To page 204)

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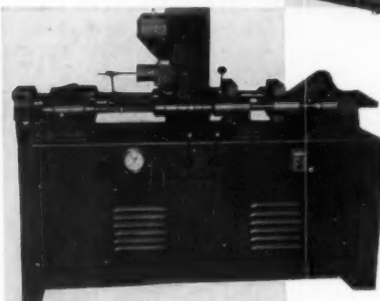
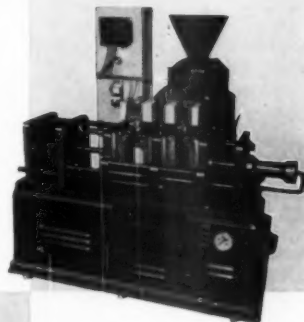


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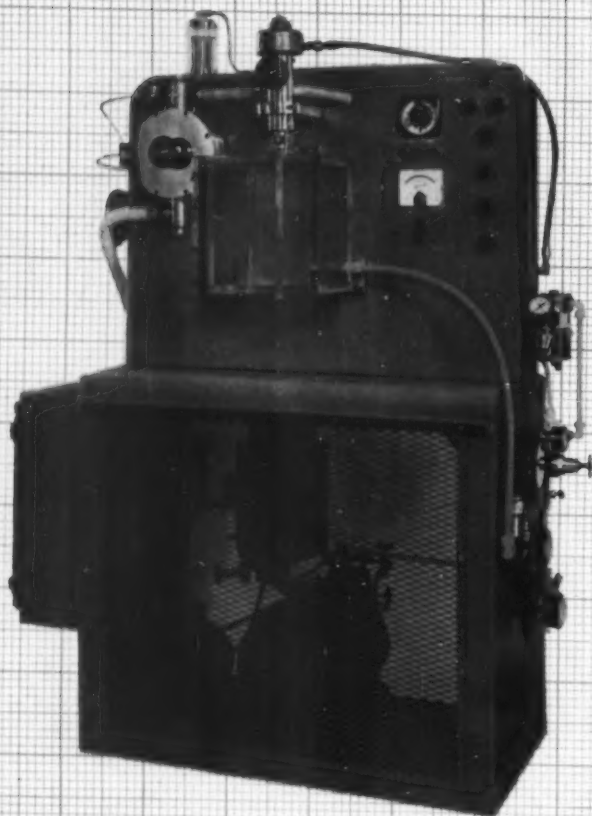
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AUTOMOTIVE, HARDWARE,
RUBBER: encapsulating, pot-
ting, sealing, bonding, cast-
ing.

COMPANIES...PEOPLE

(From page 202)

chemistry study in Italy. The fellow-
ship will cover the academic year,
Sept. 1959 to June 1960, and will be
fulfilled at Polytechnic of Milan
under the direction of Prof. Giulio
Natta.

William F. Mitchell, gen. mgr. of
General Mills' Chemical Div., elected
a VP of the company.

Harriet Raymond, advertising mgr.
of the Plastics Div., Celanese Corp.
of America, was named Advertising
Woman of the Year
by the Council on
Women's Advertis-
ing Clubs of the
Advertising Federa-
tion of America.
The award was
given for pioneering
work in coordinat-
ing advertising with



Harriet Raymond

sales marketing. Last year Miss Ray-
mond was the first woman ever to
be presented with the Executive
Award of The Society of the Plastics
Industry, Inc.

James S. Evans named acting gen.
mgr. of The Wrenn Paper Co., Mid-
dletown, Ohio, mfrs. of tech. papers
for the decorating and industrial
laminating industries.

Reginald C. Whitson named to the
new position of marketing mgr. of
Houghton Laboratories, Inc., Olean,
N. Y.

James C. Hance named Cleveland,
Ohio dist. mgr. of Jefferson Chemical
Co., Inc.

Lafe Weeks joined the Chemical
Div., E. V. Roberts & Associates, Inc.,
Los Angeles, Calif.

David Slohm joined the sales engi-
neering staff of First Machinery
Corp., and of the subsidiary com-
pany, Falcon Mfg. Div., Brooklyn,
N. Y.

Edward W. Hollis elected VP and
gen. sales mgr. of Lewis Welding &
Engineering Corp., Cleveland, Ohio.

Dr. Frank W. Reinhart, Chief, Plas-
tics Section, National Bureau of
Standards, elected a Distinguished
Member of the Society of Plastics
Engineers, in recognition of his pro-
fessional eminence in the field of
plastics.

William P. Hahn appointed to the
newly created post of tech. mgr. of
Johns-Manville Fiber Glass, Inc. He
will have direct supervision of the
product planning dept., and will
direct tech. and experimental activi-
ties in product and process develop-
ment. He will also supply mfg. depts.

Rigid plastic sheeting for every purpose



Stock sizes up to 51" x 108"

Available transparent, translucent, or opaque — in a wide range of colors.

Scranton Plastic Laminating Corp.

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and J-M sales divs. with tech. assistance in making and marketing new product lines.

Robert F. Bourke joined the sales staff of **Commercial Solvents Corp.**, San Francisco, Calif., regional office.

James A. Cruickshank named gen. sales mgr., **Naugatuck Chemicals, Div. of Dominion Rubber Co. Ltd.**, Elmira, Ont., Canada.

Wayne Smith, Erie, Pa., joined the sales staff of **Detroit Mold Engineering Co.**, Detroit, Mich.

Theodore T. Kryza appointed to the newly created position of mgr. of industrial sales, **Paterson Parchment Paper Co.**, Bristol, Pa.

Edward M. Berberian joined **Columbian Carbon Co.**, N. Y., N. Y., as tech. salesman for its Carbon Black & Pigment Div.

James E. Ferrier joined **Hartig Extruders Div. of Midland-Ross Corp.**, as sales engineer for the New York-New Jersey metropolitan area.

Robert T. Daily appointed mgr.-marketing for the **Silicone Products Dept.**, **General Electric Co.**

Donald B. Tuson named to the newly created post of VP-Finance of **Reichhold Chemicals, Inc.**, White Plains, N. Y.

Jesse R. Langston will head **Eastman Chemical Products, Inc.** new Chemicals Div. sales office at 17325 Northland Park Court, Detroit 35, Mich.

J. Franklin Everett named mgr. of Closure Technical Service in the **Armstrong Cork Co.**, R & D center, Lancaster, Pa. He succeeds **Joseph A. Benner**, who died recently.

Kenneth A. Erwin appointed admin. mgr. of the R & D Dept., **Marbon Chemical Div.**, **Borg-Warner**.

Ralph E. Wright named tech. rep.—**Molding Compound Div.**, **Acme Resin Corp.** He will be located in Amherst, Mass., and will serve the Eastern area of the United States.

Jerry Lindstrom named Chicago, Ill., area sales engineer for compression molding machines manufactured by **Baker Bros., Inc.**, Toledo, Ohio.

Jack Keiser named plant supt. of **Commercial Fiberglass Products, Inc.**, a div. of **Camdale Corp.**, Houston, Texas.

James R. Andreas, formerly asst. purchasing agent for **Rubbermaid, Inc.**, Wooster, Ohio, named marketing and adv. administrator.

Robert Bassler, formerly associated with the Chicago office of **Owens-Corning Fiberglas** (To page 206)



RELEASE PAPERS

Silicone or Quilon Treated

From product development at Rhinelander . . . new positive release papers for clean, quick, and easy separation from tacky surfaces; resistant to migration and solvent penetration. Silicone or Quilon release treatment provides you with a wide range of release effect at the right price.

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Temperature extremes—

which can rob vinyls of flexibility—are of little concern to producers who specify Plastolein low temperature plasticizers for their products. For example . . .

They know that Plastolein 9058 DOZ is the time-tested standard of the low temperature plasticizer field . . . that it provides the kind of low temperature flexibility that stays in their vinyls even after prolonged exposure to summer heat.

And more and more producers are utilizing the unusual capabilities of another Emery plasticizer, Plastolein 9078 LT, which approximates 9058 performance, but at a much lower price.

Why don't you investigate the advantage of these Plastolein Plasticizers in your coated fabrics, film, sheeting and extrusions?

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Organic Chemical Sales Department
Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio
Vopcolene Division, Los Angeles
Emery Industries (Canada), London, Ontario
Export Department, Cincinnati

COMPANIES...PEOPLE

(From page 205)

Corp., joined the Gale Products Div., Outboard Marine Corp., Galesburg, Ill., as supt. of the div.'s RP operations.

New reps.

Pacific Electric Sales Co., 140 S. E. 28th Ave., Portland 14, Ore. appointed Pacific Northwest sales rep. for Synthane Corp., Oaks, Pa. . . . Rumianca Chemical Corp., 375 Park Ave., New York, N. Y., to represent Rumianca S. p. A., Turin, Italy, in the U. S. and Canada. . . . Union Carbide Plastics Co., Div. of Union Carbide, appointed H. D. Litter Co., Inc., New York, N. Y., and Harry A. Baumstark & Co., St. Louis, Mo., distributors for Bakelite brand vinyl acetate latex, vinyl solution resins and phenolic resins. . . . Lone Star Plastics Co., Inc., Fort Worth, Texas, named Bob Ferrari, 2113 S. Western Ave., Chicago 8, Ill. and H. S. Chandler, 45 North Station Plaza, Great Neck, N. Y., reps. in their respective areas. . . . Midwest Technical Service, Downers Grove, Ill., appointed Midwestern sales and service rep. for Isocyanate Products, Wilmington, Del., mfrs. of prepolymers for foamed-in-place urethane resins. . . . B. E. Dougherty Co., Los Angeles, Calif., appointed West Coast sales agent for National Polychemicals, Inc., Wilmington, Mass. . . . Parrish Electronics, 1810 S. St. Paul St., Denver, Colo., named sales rep. for Rex Corp., West Acton, Mass., mfrs. of electronic components. . . . Ballthral Engineering Co., 1505 Race St., Philadelphia 2, Pa., appointed export sales rep. for Modern Plastic Machinery Corp., Clifton, N. J., mfrs. of thermoplastic extruders and associated equipment. . . . Nosco Plastics, Inc., appointed Nierenberg-McCardle Associates, Norristown, N. J.; Robert Lamb Agency, Detroit, Mich.; and Otto Bussenius & Co., Chicago, Ill.; new reps. . . . Sales Service Corp., 504 S. Pineapple Ave., Sarasota, Fla., named sales rep. for Alpha Plastics Inc., Livingston, N. J., for their rigid PVC pipe, fittings, and valves. . . . Achsen-Grannan, Inc., 349 Fifth Ave., New York, N. Y., will act as sales rep. for products manufactured by the plastics div. of The General Tire & Rubber Co. . . . H. J. Anderson & Co., 191 Eglinton Ave., East Toronto 12, Ont., Canada, named exclusive Canadian rep. for the plastic industries by Mount Hope Machinery Co., Taunton, Mass. . . . Lustrco Co., 1100 Mateo St., Los Angeles, Calif., appointed West Coast rep. for the complete line of metallized thermoplastic sheeting and laminations produced by Gomar Mfg. Co., Linden, N. J. . . . Carlstadt Leather Finishing Co., Carlstadt, N. J., named supplier of acrylic emulsions in the mid-Atlantic and New England States for Reichhold Chemicals, Inc.—End

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Newly-developed Daubert RELEASE with EASE papers are designed to overcome the most troublesome releasing problems involved in the production or utilization of highly tacky materials.

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Non-absorbing, non-migrating Daubert release papers are available in a variety of grades, one and two-sides treated. Should you have unusual requirements Daubert Laboratories will be happy to work with you to develop a custom-engineered sheet for you.

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Vopcolene Division, Los Angeles; Emery Industries (Canada), London, Ont.
Export Department, Cincinnati

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FOR SALE: Ovens, Grinders, Powder Mixers, Injection Molding Machines 1 oz. to 60 ozs. never used and used. Two-head Bottle Blowing Machine. Acme Machinery & Mfg. Co., Inc., 20 South Broadway, Yonkers, N.Y. Yonkers 5-0900, 102 Grove Street, Worcester, Mass. Pleasant 7-7747, 5222 W. North Ave., Chicago, Ill. TUXedo 9-1328.

MOST MODERN PACKAGING AND PROCESSING MACHINERY: Available at great savings; Package Machinery, Haysen, Scandia Wrap King, Miller Wrappers, Pneumatic Scale Automatic Carton Feeder, Bottom Sealer, Wax liner, Top Sealer with interconnecting conveyors. Pneumatic Scale Tite Wrap, Fitzpatrick Model D-6 Stainless Steel Communiters, J. H. Day and Baker Perkins 50 and 100 gal. Steam Jacketed Steel and Stainless Steel Double Arm Mixers, Day, Robinson 50 to 10,000 lbs. Dry Powder Mixers, Jacketed and Unjacketed Werner & Pfleiderer 3,000 gal. and 3,500 gal. Jacketed Double Arm Mixers Baker Perkins, from 2 to 100 gal., Double Arm Mixers, Jacketed and Stainless Steel, Colton 2RP, 3RP, 3B, 5 1/2 T Tablet Machines, Stokes DD2 and Eureka Tablet Machines. Complete Details and Quotations Promptly Submitted. Union Standard Equipment Company, 318-322 Lafayette Street, New York 12, N. Y. Phone: CANal 6-5334.

FOR SALE: 5-Used Baker Perkins size 15 JIM2, 100 gal. steam jacketed double arm Mixers; 1-Baker Perkins size 16 TRM, 150 gal. double arm Mixer; 1-Bail & Jewell #1 Rotary Cutter; 1-Kent 6" x 14" three roll Mill; 6-Stokes Model DD2, DS3, D3 and B2 Rotary Preform Presses; 4-Stokes Model "B" single punch Preform Presses. Also: Sifters, Banbury Mixers, Powder Mixers, etc., partial listing; write for details; we purchase your surplus equipment. Brill Equipment Co., 2407 Third Ave., New York 51, N.Y.

FOR SALE: H.P.M. Rubber Injection molders, 21 1/2" x 28" mold space, steam heated platens, Watson-Stillman 300 ton semi-automatic compression molding press (1947) self-contained mold size 34"x27", Watson-Stillman 250 ton 28"x24", Watson-Stillman 140 ton 22"x16", Waterbury Farrell 85 ton 20"x24", Laboratory presses—15 ton 10"x8" and 10 ton 6"x6" platens. (1) 8 ounce Lester Phoenix Injection Molder (late) with nylon attachment. Scrap cutters. Presses—all sizes. Aaron Machinery Co., Inc., 45 Crosby St., New York, N.Y. Tel.: WAlker 5-8300.

FOR SALE: Sepore 250 ton 8 platens 34" x 38 1/2", W. S. 240 ton, 10 platens 24" x 36", Baldwin-Southwark 200 ton semi-automatic transfer molding press. French Oil 250 ton 38" x 28", 200 ton hobbing press, 200 ton 16" record presses. W. S. 120 ton 3 opening 24" x 18" platens French Oil 120 ton self-contained, Hydraulic pumps and accumulators. New 3/4 oz. Bench model Injection Machines. Van Dorn 1 to 2 1/2 ounce, Lester 16 oz. and Reed 22 oz. Other sizes to 100 oz. Baker-Perkins and Day jacketed mixers. Bail and Jewell #2 Plastic Grinders and other sizes. Seco 6" x 12" and 8" x 16" mills and calenders. Hartig 3 1/4" Plastic Extruder. MPM 2" and NRM 1". Thropp 3" x 8" Lab. two roll Plastic Mill. Single and Rotary preform presses 1 1/2" to 4". Partial listing. We buy your surplus machinery. Steien Equipment Co., 107-8th St., Brooklyn 13, New York.

FIRST CLASS EQUIPMENT FROM YOUR FIRST SOURCE: Unused F-B. 2 Roll Plastic or Rubber Mills, 14" x 30" complete; Baker Perkins Heavy Duty Jkt Mixers up to 500 Gal.; Special 300 Gal. Stainless Vacuum Mixers, Sigma Arms; Bot. discharge; 250 Ton Self Contained Laminate Press; F-B. 3 Roll Calender 8" x 16" comp; Preform Presses, Rubber Cutters etc. First Machinery Corp., 209 Tenth St., Brooklyn 13, N.Y. Phone ST-8-4672.

SUMMER SPECIALS: Francis 485 Ton, 3 Ram, 124" x 52" Laminating or Veneer Press, 5' Daylight, 3' Stroke, fully self contained. Adamson 500 Ton, 8 Ram, 74" x 106" Laminating or Veneer Press, 4' Daylight, 16" Stroke. Cumberland #18 Rotary Scrap Cutter, new in 1953, complete with 20 HP Motor. Lake Erie 60 Ton and Watson-Stillman 75 Ton Automatic Molding Presses, complete with push button stations, fully self contained. Autovac Vacuum Former with 48" x 72" molding area, 15" drape, new in 1955 and used only one week. Can be inspected under power. We also have available 21 to 1 ratio Plastic Extruders in sizes up to 3 1/2"; a complete line of ovens, blenders, mixers, LaRose Preheaters, Mills, Injection Molders, Presses, etc. for the Plastic and Rubber Industry. We will finance. Johnson Machinery Company, 683 Frelinghuysen Ave., Newark 12, New Jersey, Bigelow 8-2500.

FOR SALE: 43-Baker-Perkins #17, 200 gal. jacketed mixers, sigma and duplex blades, many with individual 30 HP motors and drives, power-screw tilts. 2-Baker-Perkins 100 gal., sigma or dispersion blades, jacketed. 3-Baker-Perkins 50 gal., sigma blades, jacketed. 2-J. H. Day 35 gal. sigma blade. Perry Equipment Corp., 1429 N. 6th St., Phila. 22, Pa.

FOR SALE: 3 compression molding presses, 470, 200 and 42 tons; 1 Cumberland 7" stair step dicer; 1-22" x 60" plastics mill; 5 Stokes preform presses, models E, F, R, RD-3, DS-3, 1-70 cu. ft. jacketed steel ribbon blender; also extruders, mixers, cutters, etc. Chemical & Process Machinery Corp. 52 9th St., Brooklyn 15, N.Y. HY 9-7200.

FOR SALE: Battenfeld fully automatic Injection Molding Machine, model BSM 40 S AW 2 oz. capacity. Excellent condition. Has had very few operating hours. Can be seen in operation by appointment. Sterling Plastics Co., 1140 Commerce Ave., Union, N.J.

FOR SALE: 4 D&B 384 Ton Hydraulic Presses, 14" Ram, daylight 61"-24 1/2" between rods. 4 D&B 196 Ton Hydraulic Presses, 10" Ram, 16 1/2" between rods. 2 D&B 96 Ton Hydraulic Presses, 7" Ram. Mack Molding Co., Arlington, Vt.

HYDRAULIC LAMINATING PRESSES: 1 Dunning and Boschert press, 211 ton, 2100 psi, 3 opening, 20x20" platens, electrically heated, complete with controls and Racine hydraulic unit, 1 year old. New condition. 1 R. D. Wood press, 1500 psi, 2 opening, 20x20" platens, electrically heated. Sandymac Corp., P.O. Box 505, Traverse City, Michigan.

FOR SALE: Complete Fiberglass Molding Department consisting of two Erie 110 ton hydraulic presses, 48" x 56" bed and 30" x 36" bed, both 50" stroke and 72" daylight, Vickers three stage pumping unit with all controls, 52" Morrison type preform unit, Lanley preform drying oven, and necessary auxiliary cutters, sprayers, etc. Regal Plastic Company, 2800 East 14th Street, Kansas City, Missouri.

FOR SALE: 1-2 cavity 16 oz. Container Die Built to run in 2-3 oz. Impeco or L-2-C-4/6 Lester Molding Machine. 1-2 cavity 8 oz. Container Die Built to run in 2-3 oz. Impeco Molding Machine. 1-2 cavity Cap Die fits both 8 & 16 oz. Container Built to run in 2-3 oz. Impeco. These Dies are in perfect condition, less than 1 year old. Should further information be required contact: Leon D. Bush & Sons Inc., 4250 W. Diversey Ave., Chicago 39, Illinois.

FOR SALE: Fellows 8 oz. Injection Machines. Can be seen in operation in New Jersey. Reply Box 5701, Modern Plastics.

FOR SALE: One 48 oz. HPM Machine, practically new, with Vickers pumps, 150 H.P. Can be seen in good operating condition for sale at practically 50% new cost. For immediate delivery. Reply Box 5702, Modern Plastics.

FOR SALE: One Impeco vertical injection molding machine, Model VF 822 A.—22 oz. capacity, in excellent condition. Reply Box 5703, Modern Plastics.

Machinery wanted

WANTED TO BUY: Used injection molding machines, oven, granulators. One machine or complete plant. Acme Machinery & Mfg. Co. Inc., 20 South Broadway, Yonkers, N.Y. Yonkers 5-0900, 102 Grove Street, Worcester, Mass., Pleasant 7-7747, 5222 West North St., Chicago, Illinois, TUXedo 9-1328.

WANTED TO BUY: 4 or 6 oz. Injection Molding Machine—also Gorton 3 L Engraving Machine. T. D. Shea Co., 7026 East Seven Mile Rd., Detroit 34, Michigan. Tw. 1-1670.

Materials for sale

GENERAL PURPOSE, MEDIUM AND HIGH-IMPACT POLYSTYRENE AND POLYETHYLENE molding materials for sale in any color or quantity. Packed in 50 lb. bags. Now at our lowest prices in years. For top quality materials, at big savings, write: Gering Plastics division of Studebaker-Packard Corp., Kenilworth, New Jersey, Department M. Or call: (N.J.) BRidge 6-2900.

Materials wanted

WANTED: Plastic of all kinds—virgin, reground, lumps, sheet and reject parts. Highest prices paid for Styrene, Polyethylene, Acetate, Nylon, Stylin, etc. We can also supply virgin & reground materials at tremendous savings. Address your inquiries to: Gold-Mark Plastics Compounds, Inc., 4-05 26th Ave., Long Island City 2, N. Y. RAvenswood 1-0880.

GET THE TOP MONEY FOR PLASTIC SCRAP: Now paying top prices for all thermoplastic scrap. Wanted: polystyrene, cellulose acetate, vinyl, polyethylene, butyrate, acrylic, nylon. All types and forms including rejects and obsolete molding powders. Fast action wherever you are located. WRITE, WIRE TODAY! Reply Box 5704, Modern Plastics.

METALLIZERS: We will buy your vacuum metallized and plated styrene scrap and rejects—or completely clean your scrap on a custom basis. Plastic Converters, Inc., Townsend, Mass. Tel. Townsend 756.

TEFLON SCRAP WANTED: Increase your profits by handling your scrap properly, and selling it at top prices. Call or write us today for our suggestions. Davies Nitrate Co., Inc., 114 Liberty Street, New York 6, New York.

Molds for sale

FOR SALE: One 8-cavity full-pack Cig. Case Mould to produce King and Regular-size Cigarette Cases; one 8 and one 12-cavity plastic hinged cover Soapbox Mould; one 8-cavity new type, and one 4-cavity automatic Ejector Cigarette Case Mould; one Mould to produce an attractively designed shopping bag; Several Toy and Houseware Moulds and other items. All Moulds are in excellent and perfect working condition. Reply Box 5705, Modern Plastics.

FOR SALE: Complete complement of wall tile molds in excellent condition. Every accessory mold and three lines of field tile molds included. Write Box 5700, Modern Plastics.

(Continued on page 210)

Can it be sleeping that's making you tired?



... Time to wake up and let PEERLESS show you what's new in Plastics Marking.

We at PEERLESS have developed a roll leaf that resists wear ... oil and alcohol stain ... perspiration ... and most every type of punishment possible.

PEERLESS Roll Leaf Company has marked practically every type of plastic ... has made equipment for marking most every size and shape of plastic product ... and continues to be first in their field with new advancements in plastics marking, and the manufacture of plastics marking machinery.

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REPRESENTATIVES: ST. LOUIS • LOS ANGELES • SAN FRANCISCO • LOUISVILLE • MONTREAL • LONDON, ENG.

(Continued from page 208)

Help wanted

PERSONNEL: Executive-Technical—Sale-Production. Employers and Applicants—whatever your requirements, choose the Leader in Personnel Placement. Cadillac Associates, Inc., Clem Easley—Consultant to Plastics Industry, 29 E. Madison St., Chicago, Ill.—Wabash 2-4800. Call, write or wire—in confidence.

VINYL CHEMIST: B.S. in Chemistry or Chemical Engineering. Experience in raw material evaluation for vinyls. Capable of handling complete laboratory customer service and possible field sales engineering. Good opportunity with medium sized expanding chemical specialty manufacturer. Send complete resume including salary required and picture if available. All replies treated with strict confidence. Reply Box 5706, Modern Plastics.

PLASTICS TECHNICIAN: Pigment sales company is interested in a technician experienced in the formulation and processing of thermoplastic resins for its technical service laboratory. Working knowledge of equipment such as the two-roll mill and extruder essential. Background in pigment application very helpful. Our staff knows of this advertisement. Ciba Company, Inc., Pigment Division, Fair Lawn, New Jersey.

HELP WANTED: Experienced salesman to sell service of grinding and to purchase scrap plastic, eastern U. S. Write age, experience, and salary you expect to earn. Answers treated confidentially. Reply Box 5707, Modern Plastics.

MIDWESTERN MANUFACTURER seeks sales representative with following in electrical and mechanical industries to sell high quality, high priced, injection molded plastic parts. Factory equipped to provide metalizing, hot stamping, roller printing, silk screening, etc. Reply Box 5708, Modern Plastics.

MOLDING SUPERINTENDENT WANTED: Medium size Midwestern injection molding plant seeks molding superintendent with experience. Many employee benefits including paid vacation, Christmas bonus plan, Hospitalization/surgical insurance. Write stating details to Box 5724, Modern Plastics.

PRODUCTION MANAGEMENT OPPORTUNITIES: Expanding Division of multi-plant national company, offers unusual opportunities in film extrusion engineering, plant supervision, quality control, flexographic and rotogravure printing, machine designers. These are growth positions for responsible, ambitious men with America's Oldest Bag Maker. Reply to: Plastics Division, Chase Bag Company, 155 East 44th St., New York 17, New York.

PLASTICS EXTRUSION ENGINEER: Extrusion and thermoforming experience with the ability to design and supervise the construction of equipment and molds. Should be capable of putting new machinery into production, improving upon existing equipment, and solving production problems. A good knowledge of electricity and "gadgetering" would be helpful. This is a challenging opportunity with a dynamic organization. Reply Box 5725, Modern Plastics.

PLANT MANAGER: Man with engineering background preferred. New England Plastic Manufacturer of PVC compounds, Polyethylene, Color Concentrates. Outstanding opportunity for qualified man with knowledge of equipment processes. Reply Box 5727, Modern Plastics.

PLASTICS FILM EXTRUSION ENGINEERS: Multi-Plant film extrusion company has openings in expanding technical department for process and development engineers at various levels. Positions cover wide range of projects. Prefer applicants with polyethylene extrusion background. Please state full details of education, experience, and salary expected in reply. Box 5726, Modern Plastics.

MANUFACTURERS' REPRESENTATIVES—To handle choice line of automatic plastic injection molding machinery in areas of Georgia, Alabama, Carolinas, Florida, Louisiana, St. Louis, San Francisco, Rocky Mountain, Kentucky-Tennessee, New York City, Puerto Rico.

Require aggressive individual or organization with experience in injection molding or technical background in this field with ability to handle service problems on automatic equipment. Please furnish resume of present territory, lines carried and sales background. Reply Box 5709, Modern Plastics.

CHEMIST: Experienced in PVC Compounding and extrusion, to manage laboratory and development section—New England area. Salary commensurate with experience. Send resume or phone Holton & Roach, 230 Park Avenue, New York 17, New York. MURRAY Hill 9-2514. Our employees know of this ad.

OUTSTANDING OPPORTUNITY: Fiberglass Production Manager and Exper. Tooling, Mold & Pattern-Makers needed for recently expanded, established fiberglass boat manufacturer. State experience, age, salary requirements in first letter. Luger Industries, Inc., 9200 Access Rd., Minneapolis 20, Minn.

ASSISTANT PLANT MANAGER in charge of Production and Maintenance in Polyvinyl Chloride Resin Plant. Must have Chemical Engineering degree B.S. at least 3 years experience. Plant located in New England. Salary commensurate with exp. Reply Box 5710, Modern Plastics.

WANTED: PLASTIC PRODUCTION MANAGER—AA1 manufacturer offers unusual opportunity to a production specialist, capable of taking full responsibility of a new compression molding division molding large parts from thermoplastic, phenolic, and resin impregnated woodfurf material. Must be able to train new personnel in molding and finishing techniques. Experience in painting the plastic parts is helpful, but not necessary. Send complete details of education, experience, salary requirements, etc. All information received will be kept confidential. Box 5711, Modern Plastics.

EXTRUSION PRODUCTION MANAGER: Capable aggressive, with minimum ten years experience in all phases of plant management. Excellent knowledge of tool, machine, and die design. Good mechanical and electrical background. Experienced in tubing, pipe, sections, sheet, and custom work in thermoplastics. Position open with new aggressive firm. Reply P.O. Box 6583, Phoenix, Arizona.

TOOL DESIGNER: Well established, growing proprietary molder is seeking man experienced in injection mold design. Knowledge of modern molding equipment and plant engineering desirable. Excellent permanent position. Plant located in New York Metropolitan area. Send complete resume with salary requirements to box 5712, Modern Plastics.

SALES ENGINEER—AAA-1 manufacturer needs aggressive district sales manager with solid experience in plastics machinery sales. To be located in New England area. Salary negotiable. Please send resumes to Box 5713, Modern Plastics.

NEW PRODUCTS! The Mead Corporation Laboratories have staff positions open for technically trained men who are interested in New Products Research and Development for the paper industry. If you are product-minded, creative, with interests or experience in plastics, resins, and new types of paper and board, you should consider this advertisement seriously. We offer opportunity for recognition and growth with friendly working and living conditions. Location: Chillicothe, a pleasant town of 28,000 in southern Ohio. Your inquiry with full resume will receive immediate confidential attention. Write to: Hugh E. Meilinger, Technical Employment Supervisor, The Mead Corporation, Chillicothe, Ohio.

EXTRUDER ENGINEER: Exceptional opportunity available for experienced Project Engineer. Leading extruder manufacturer needs man for early advancement to Chief Engineer. Send resume, including salary requirements, to Box 5714, Modern Plastics.

PLASTICS CHEMIST, EXPERIENCED: Development and applications testing of additives in all types of polymers. Send resume and salary requirements to: Celgry Chemical Corporation, Saw Mill River Road, Ardsley, New York.

WANTED: Plastics engineer—A leading manufacturer of guided missiles located in the southeast has opening for Plastics Engineer with experience in reinforced structural plastics, fabrication, testing and part development. Prefer Chemical Engineer with a minimum of 5 years industrial experience. Send resume including education, experience and salary expected. Outstanding benefits and opportunity available. Write Box 5715, Modern Plastics.

SALES MANAGER: Young expanding company needs experienced merchandiser in houseware field. Industrial sales experience desirable but not necessary, sound experience in sales promotion, advertising and product development, Southern California, outside smog belt. Send full resume. Reply Box 5716, Modern Plastics.

CUSTOM EXTRUSION MANAGER—Unusual opportunity to join executive staff of one of America's progressive plastic manufacturers for man technically qualified in die design and operating technique. Self Starter wanted; will be responsible for entire dept., price quotations, training of operators, etc. Relocate in beautiful, healthful Connecticut River Valley—ideal for better family living. Replies held in the strictest confidence. Send resume direct to the President, Deerfield Plastics Co., Inc., South Deerfield, Mass.

EXPANSION OF PRODUCTION FACILITIES in our plastics plants has created opportunities for additional "top flight" sales representatives at: Maynard Plastics . . . Extrusions; Webster Industries . . . Polyethylene Film; Salem Plastic Chemical . . . Compounds; Essex Plastic Machinery . . . Machinery; Novelty Plastics . . . Vinyl Film & Sheeting. Qualified salesmen servicing the plastics industry interested in any of the above lines are invited to apply by letter only. Remuneration commensurate with ability and experience. Our people know of this ad. Apply in confidence to Ben Faneuil, President, Chelsea Industries, 181 Spencer Ave., Chelsea 50, Mass.

Situations wanted

EXTRUSION ENGINEER with background in most types of custom thermoplastics extrusions, and sheet, also experienced in thermoforming. Strong in automation and development. Would like to concentrate on development of equipment, processes, or products. Versatile and imaginative shirt-sleeve type, who likes to solve problems. Available to progressive company. Reply Box 5717, Modern Plastics.

THERMOPLASTIC COLOR SPECIALIST: Complete background in color-matching. Broad experience in all phases of color problems. Production as well as research and development work. Supervisory experience. Desires responsible and challenging position in this or related field. Age: late twenties. B.A. degree with honors. Married. Reply Box 5718, Modern Plastics.

CHEM. ENG.: Successful record in vinyl coatings, product development, sales, and plant management. Available for management position. Now employed. Reply Box 5719, Modern Plastics.

CAREER MAN, 33, family, seeks challenging position as superintendent or assistant plant manager of small plant. Twelve years complete shop background, finisher to foreman, with three top molders midwest. Some injection. Heavy compression—molding techniques, troubleshooting, maintenance, finishing methods, set-up, automatic machinery. Competitive know-how. Reply Box 5720, Modern Plastics.

ESTABLISHED MANUFACTURER'S REPRESENTATIVE Chicago area experienced plastics and paper packaging seeking additional line of merit. Excellent connections general food and industrial fields. Can give energetic coverage along with creative selling ability. Know this market and its potential and can gain acceptance no matter what the product for high volume sales. Reply Box 5721, Modern Plastics.

(Continued on page 212)

Use your Encyclopedia Issue!

Most of the material in your copy of the Modern Plastics Encyclopedia Issue is *work data*—information which companies working with plastics can put to valuable use, day-in and day-out.

This 1,218-page volume gives complete coverage to such important subjects as the characteristics of plastics materials, and the employment of fillers for lowering the cost and increasing the strength of plastics parts. Plastics coatings and foamed plastics are discussed exhaustively, as are all important finishing and decorating methods. New cost-reducing slants on vacuum forming, deep drawing, injection molding, extruding, and other production techniques are explained, too.

Countless hours of hunting for sources of supply can be saved by referring to the efficiently indexed Buyers' Directory and to the helpful advertisements of leading suppliers.

Don't Overlook the Helpful Plastics Charts

Nine important charts in your Encyclopedia provide vital technical and engineering data on films, adhesives, coatings, laminates, foams, fibres, and plasticizers. In addition, the famous Plastics Properties Chart (now in two parts: Thermoplastics and Thermosets) have been completely redesigned for easy reading. Both are suitable for wall mounting.

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A BRESKIN PUBLICATION

575 Madison Avenue, New York 22, N. Y.

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THROUGH INCREASED
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Positive pressure and exact registration of the part in the mask. Reduce rejects. Free both hands for productive movements.

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50% faster than any other make. Cut solvent consumption. Avert production delays due to damaging of masks by hand scrubbing.

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A competent engineering staff will counsel with you on the most efficient technique for handling your particular requirements.

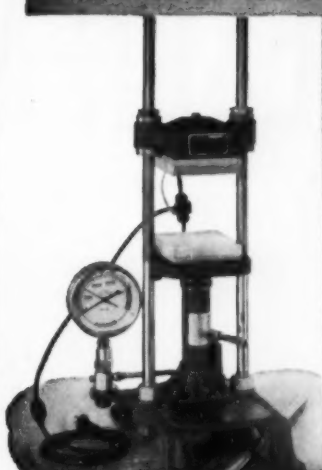
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for
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Problems*



Accurately controlled pressures to 20,000 lbs.; 6-inch gauge mounted on base. Carver Standard Accessories include Electric or Steam Hot Plates, Carver Test Cylinders, Swivel Bearing Plates, Cage Equipment. Available from stock. Write for catalog.

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HYDRAULIC EQUIPMENT**

3 CHATHAM ROAD, SUMMIT, N. J.

(Continued from page 210)

Miscellaneous

WANTED TO BUY: Small to medium size plastics operation in Los Angeles area. Will buy outright or arrange for continuation of present management. Reply Box 5722, Modern Plastics.

GO AHEAD SWISS FIRM of international reputation anxious to procure sole representation of American Manufacturers of Specialty raw materials for the Plastics, Paint, Printing Ink, and Allied Industries. Hard work presents no problem. Please reply under Cipher P 59306 Z to Publicitas Zurich (Switzerland).

WANTED TO BUY: Established manufacturing company, 50 years old, is interested in purchasing injection molding plant in greater N.Y.-N.J. area. Should have 8-10 machines of 6-12 oz. capacity, and preferably have its own tool room and mold building facilities. Wish to retain management with part interest. Now using plastic products in substantial volume. Company we are seeking should be making money now but with our additional volume and sales opportunities wants to make more. Ideal opportunity for well-managed competently engineered plant. Inquiries will be treated in strict confidence. Wish to deal with principals only. Reply Box 5729, Modern Plastics.

IMS OFFERS the injection molding industry's only independent, unbiased consulting service on your heating cylinder problems on older injection machines. When your cylinder repair costs are soaring, when your presses have too much or too little plasticizing capacity, or when you want to know just what you can expect from an older injection machine... Call us for a consultation. Per diem consultation fee refunded if an IMS Cylinder solves your molding prob-

lems! Phone or write us today. Injection Molders Supply Company, 3514 Lee Rd., Cleveland 20, Ohio. Phone WYoming 1-1424.

SELL THE MOLDER AND EXTRUDER IN THE MIDWEST—Intensive coverage. A company of experienced and well known representatives is being formed to sell a complete line of primary and auxiliary equipment, resins and expendables to the molders and extruders in Michigan, Indiana, Illinois, Kentucky, Ohio and Western Pennsylvania. Our men will have territories designed to give maximum results and take full advantage of time and place factor. Will handle some of the following type items: Extruders, take-off equipment, injection molding machines, vacuum forming machines, grinders, ovens, hopper loaders, colorants, mold release, resins, hot stamp machines, barrel tumblers, foil, etc. If you need effective representation in the Mid-West, write today outlining your product. Reply Box 5728, Modern Plastics.

WILL PURCHASE FOR CASH going plastics company in injection or other type molding located in midwest. Will retain present management. Penn Pacific Company, 1420 Oliver Bldg., Pittsburgh 22, Pennsylvania, EXpress 1-1545.

FOR LEASE OR SALE: Rotational plastic manufacturing plant, fully equipped office and printing department. Now in operation in Atlanta, Georgia, making 31 vinyl toys that are original creations, selling nation wide. We also have Dipping Machine. Plant can make industrial items. Present management can be retained for two years, then retiring. Good lease on plant and building to responsible parties. First year's lease money can be applied against purchase price. Write William G. Minder Industries, Inc., 317 Hayden St. N.W., Atlanta 13, Ga.

MANUFACTURER'S AGENTS: To sell vacuum forming; facilities available for blister, heat seal and skin packing. Write P.M. Corporation, 926 N. Lawrence St., Philadelphia 23, Pa.

CANADIAN MANUFACTURER, long established in Injection Molding business with most modern facilities would like to make contact with U. S. Molder in fast moving line of Plastic Toys & Premiums. We have complete Canadian Coast to Coast coverage. Would work out mutual arrangements upon receipt of replies. Reply Box 5723, Modern Plastics.

RATES FOR CLASSIFIED ADVERTISING

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Per inch (or fraction) \$30.00; each 3 inches or fraction (in border) \$15.00 extra

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For purpose of establishing rate, figure approximately 50-55 words per inch.

For further information address Classified Advertising Department

Modern Plastics, 575 Madison Avenue, N. Y. 22, N. Y.

Modern Plastics reserves the right to accept, reject or censor classified copy.

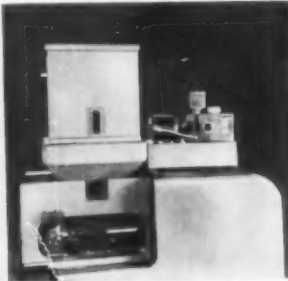
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SERVING THE PLASTICS INDUSTRY



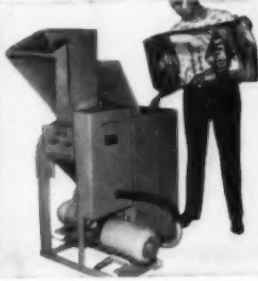
1 Hopper-dryer and Jet hopper loader

More production, lower costs, higher products quality because of properly controlled conditioning of material, no compressed air. Easy installation in minutes.



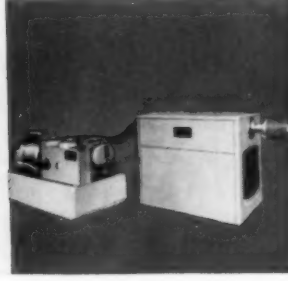
2 Thoreson-McCosh Hopper-dryer

Dries and preheats material at less cost than conventional drying ovens. Easy installation on standard injection and extrusion machines. No compressed air.



3 Shearway granulator, blender and loader

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NATCO 800

80 oz. SHOT — single feed!

PARTS UP TO 30" DEEP — fast!

DEPENDABLE because it's shockless!



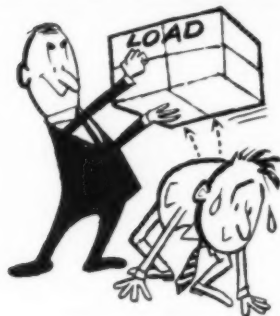
SHOT CAPACITY	80 oz.
CLAMP PRESSURE (MAX.)	350 tons
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If you have a burdensome problem in sealing sheet plastics for your product, it is entirely possible that our specialized engineering group can give you a big lift. Collaborating with your production people, as we have done with many "big name" industries, our engineers may be able to expedite your production . . . with heat sealers we have in stock, or equipment especially designed and built for your needs.

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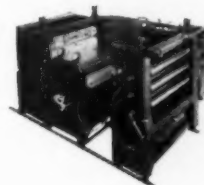
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This Goulding engineered POLISH ROLL STAND gives better gauge and finish on sheets of various materials with wide range of thickness. FIRST with dial controlled speed selection. Upper and lower cylinders hydraulically adjusted. Haul off rolls with TRAVELING SHEAR provide perfect control for take-off through dial arrangement for roll speed selection. Upper roll hydraulically adjusted. ROCKER TYPE TRAVELING SHEAR and SHEET LENGTH SELECTION THROUGH DIAL ARRANGEMENT . . . also Goulding FIRSTS . . . allow positive length control with square cutoff. Specifications, prices and delivery data upon inquiry.

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OF MODERN AUTOMATED
PLASTICS EQUIPMENT

Goulding
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Perhaps you can't develop a urethane foam as light as these bubbles—even with Wyandotte's help.

But, Wyandotte can help you *control* many of the basic characteristics of urethane foams . . . get the desired degree of resilience, weight per unit volume, toughness, shock absorbency, insulating properties. For, Wyandotte pioneered in the development of the polyethers that have improved urethane foams, given them a longer useful life, and a far wider range of other properties . . . therefore has both the raw materials and the technical background to assist you in tailoring your formulation to your needs.

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(Continued from page 214)

3rd cover Pittsburgh Coke & Chemical Co., Industrial Chemicals Div.

23 Plastics Engineering Co.
142 Plastistamp
127 Powell Pressed Steel Co., The
171 Price-Driscoll Corp.
51 Prodex Corp.
180 Progressive Machine Co., Inc.

216 Radial Cutter Mfg. Corp.
185 Rainville Co., The
57 Reichhold Chemicals, Inc.
115 Reifenhauer KG.,

H. H. Heinrich, Inc.
205 Rhineland Paper Co.
76 Riegel Paper Corp.
112 Rohm & Haas Co.
196 Ross, Charles, & Son Co., Inc.
160 Roussel Corp.
149 Royle, John, & Sons
175 Rubber & Asbestos Corp.

129 Schulman, A., Inc.
193 Schwartz Chemical Co., Inc.
205 Scranton Plastic Laminating Corp.
70 Sealomatic Electronics Corp.
187 Seiberling Rubber Co., Plastics Div.
135 Semet-Solvay Petrochemical Div., Allied Chemical Corp.
27 Shaw, Francis, & Co. Ltd.

38 Shell Chemical Corp. Plastics and Resins Div.
70C Shell Chemical Co. Ltd.
195 Stanley Chemical Co.
Stokes, F. J., Corp.
103 Plastics Equipment Div.
184 Vacuum Equipment Div.
137 Sylvania Electric Products Inc., Chemical & Metallurgical Div.

150 Thermel, Inc.
212 Thoreson-McCosh, Inc.
68 Triulzi

15, 16 U. S. Industrial Chemicals Co., Div. of National Distillers and Chemical Corp.
148A, B Union Carbide Int'l Co., Plastics Dept.
66, 67 Union Carbide Plastics Co.
123 United States Rubber, Naugatuck Chemical Div.

49 Van Dorn Iron Works Co., The
117 Vic Mfg. Co.

71 Waldron, John, Corp.
Wallace & Tiernan, Inc.
164 Harchem Div.
197 Lucidol Div.
181 Watertown Mfg. Co., The
100 Welding Engineers, Inc.
14 Wellington Sears Co.
77 Werner & Pfleiderer Corp.
154 West Instrument Corp.
143 West Penn Power
162, 163 Wiegand, Edwin L., Co.
64 Windsor, R. H., Ltd.
157 Woloch, George, Co., Inc.
159 Wood, R. D., Co.
62 Worbla Ltd.
215 Wyandotte Chemicals Corp.

217 Yardley Plastics Co.

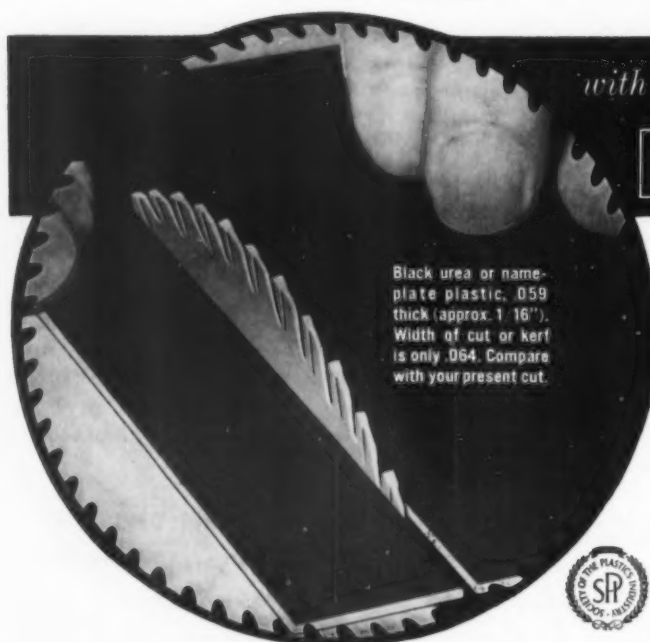


**MODERN
PLASTICS**

PUBLISHED BY BRESKIN PUBLICATIONS INC. 575 Madison Avenue, New York 22, N. Y.



- **NO edge chipping or cracking**
- **NO sanding or finishing**
- **Up to 50% less waste**



Black urea or name-plate plastic, .059 thick (approx. 1/16"). Width of cut or kerf is only .064. Compare with your present cut.

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THIN-KERF⁺ fine pitch blades

Designed specifically to cut thermosetting and thermoplastic materials, printed circuitry, expensive woods, veneered plywoods and light non-ferrous metals, Radial Cutter Thin-Kerf blades cut smoothly and precisely without edge chipping or cracking... eliminate sanding and finishing operations... reduce material waste up to 50%. Ideal for hand-feed, precision operations and, under certain conditions, power feed single or gang-cutting operations. Write today for prices and specifications.

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Special shapes or standard, rigid or flexible, in diameters from $\frac{1}{2}$ " to 16". Our engineers have developed advanced techniques that can save time and money on the right shape for your specific needs.



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*Write for Bulletin 180 — and for
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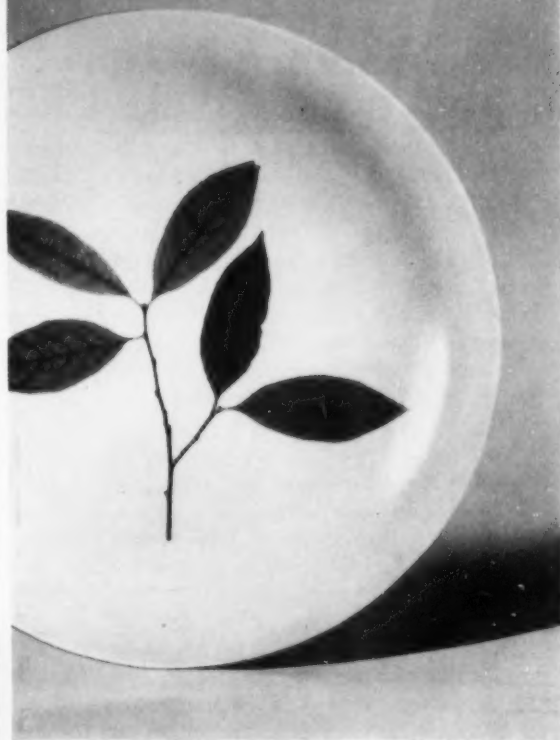
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JULY 1959

Design*: by Commercial Decal

For: Autumn Memory in Oneida Premier**



How to **harvest** bigger ware sales:

The quiet elegance of this "Autumn Memory" pattern illustrates one big way. For decorations *do* make the difference!

Today—why don't *you* find out how easily you can enlist the 40-year design and manufacturing experience of Commercial Decal to help you. Simply write for free test samples and full information. Commercial Decal, Inc., 650 S. Columbus Ave., Mt. Vernon, N.Y.

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**Manufactured by ONEIDA SILVERSMITHS

COMMERCIAL DECAL

217



A lesson in public relations

As a major solution to the many-sided problem of infant deaths through the mis-use in re-use of super-thin polyethylene film in which clothes are delivered from cleaners, The Society of the Plastics Industry, Inc. has embarked on an advertising and publicity program designed to educate parents on the dangers of mis-use. The advertising and public relations program, plus legal fees and lobby work to prevent misguided legislation, will cost at least \$750,000, approximately \$600,000 of which will be spent in a six-week crash program.

Eighty percent of the money is to be put up by the makers of low-density film-grade polyethylene; 20% will be put up by film makers and converters.

The intention behind the plan is worthy. This industry has gone through many periods of anti-plastics publicity because of consumer discontent over mis-applications, but now, for the first time, human life is involved. And the life of one child is worth more than the total money that will be spent on the project.

Besides this, the fact that the industry has accepted responsibility for expensive public education in the matter is evidence of its adulthood. It is proof to the public that the industry has public interest at heart. In the face of about as bad publicity as any industry ever had, it is a sincere and forthright action, not a whitewash job.

Meanwhile, as will be noted on p. 93 of this issue, work is being done in the laboratories on various mechanical methods of rendering this thin film non-injurious to infants, by perforation and other means.

It seems to us, however, that our industry may have a lesson to learn from this whole development—a lesson in continuing and perpetual public relations.

Our public relations-promotional-education activities have been to date piecemeal, spotty, uncoordinated, and directed toward the interests, not of the industry, but of its various segments. We have had activity in styrene wall tile, vinyl film and sheeting, thermoplastic pipe standards, reinforced plastics, etc. We have spent a fair amount of money over the years, but not to reflect the plastics industry as an industry.

We believe that a centralized, coordinated, and continuing public relations program could help to obviate crash programs, and over the years would create public respect and appreciation of this industry and its products.

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